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Compendium Artis Nauticæ,
BEING THE
DAILY PRACTICE
Of the whole ART of
NAVIGATION;
WHEREBY
All the PROBLEMS of *NAVIGATION*
and *ASTRONOMY* practicable at SEA, are
eaſily, expeditiouſly and exactly performed,

ONLY BY
Tabular Inſpection:
WITHOUT
The Operation of PLAIN and SPHERICAL TRIGONOMETRY;
each *Problem* being amply explained, and rendered intelligible to the
meaneſt Capacity; ſo as to enable them to keep an Account of the *Ships
Way*, both by *Plain* and *Mercator*'s-*Sailing*: All being wholly New, and
exactly agreeing with the niceſt Calculation, and may readily be applied
to moſt Parts of Practical MATHEMATICKS.

By *JOHN COLLIER*,
Formerly Teacher of the *Mathematicks* to the Gentlemen
Voluntiers in the ROYAL NAVY.

K

Noviter, non Nova.

LONDON:
Sold by *J. Harbin*, at *Charing-Croſs*; *B. Motte*, at *Temple-Bar*; *F. Simons*, at *Bow-Church*;
W. Meadows, in *Cornhill*; *S. Goodwin*, near *Cree-Church*; *S. Fitzer*, in the *Minories*;
C. Digby, at the *Hermitage*; and *E. Baldwin*, at *Ratcliff-Croſs*, 1729.

TO THE

READER.

I *Muſt beſpeak your Favour in a candid Reception of this New Method of diſpatching by* Tabular Inſpection, *in a ſhort and exact Way, what muſt neceſſarily require much Pains, Skill and Time, in the long Courſe of* Trigonometrical *Operations. And as they were contrived ſome Time ſince, for the particular Uſe of Gentlemen* Voluntiers *that were under my Care in the* Royal Navy, *and others in the* Merchants Service; *and with the laſt, in one Voyage to the* Eaſt *and another to the* Weſt-Indies, *were found by Experience to be very ſerviceable in the Buſineſs of* Practical Navigation. *I now publiſh them for the general Uſe of Sailors, eſpecially thoſe who may not have Leiſure or Capacity to undergo the Fatigue, or overcome the Difficulty of* Trigonometrical *Operations, and hope they will be judged uſeful and eaſy, inaſmuch as common Underſtanding and ordinary Attention, will, by the Aſſiſtance of theſe* Tables, *lead the Sailor through all the practical Parts of* Navigation, *provided he is ſo well verſed in Arithmetick that he can readily add, ſub-*

tract, multiply and divide, and is acquainted with the uſual Sea Terms, ſo far as to know the Head, Stern, Bow, Beam and Quarter of a Ship, when ſhe hath the Starboard, and when the Larboard Tacks on Board; and then which is the Lee, and which the Weather ſide, which are familiarly known by every one that uſes the Sea, and if he is poſſeſſed of the abovementioned Attainments, he needs no more to enable him to apply theſe Tables, *to Practice, with the deſired Advantage.*

I could have more amply enlarged upon each Problem, *and have given two or three more* Examples *in each, but as Expedition and Exactneſs are the chief Buſineſs of a careful and induſtrious Sailor, and as theſe* Tables *were firſt deſignedly calculated to ſerve thoſe Purpoſes, I have avoided running into any Length by Variety or Multitude, but have preſerved Perſpicuity, and I hope Brevity, ſo as to propoſe and explain the Matter, as to be within the Apprehenſion of the meaneſt Capacity:*

To the Right Honourable

Lord *ARCHIBALD HAMILTON*.

MY LORD,

HAving for many Years, carefully Inſtructed ſeveral Gentlemen *Voluntiers* and others in the *Royal-Navy*, and in the Courſe of Teaching the *Practical Sailor*, finding the Operations of *Plain* and *Spherical Trigonometry* very tedious for the Buſineſs of NAVIGATION, have form'd proper and true *Tables*; for all the Purpoſes of keeping an Account of a *Ships Way*, in which by Inſpection will be ſeen immediately, what in Operation muſt neceſſarily take up a Length of Time. And as this Method may be of great Service to facilitate the Practical Part of NAVIGATION in the Uſes aforeſaid, and having had the Honour and Opportunity of improving the Practice of *Navigation* under your Lordſhip's Command in the *Royal-Navy*, I humbly ſubmit it to your Lordſhips Patronage; begging your Acceptance of theſe my Endeavours, which under your Lodſhip's Approbation and Recommendation, will I am ſure, have their due Weight with all that Command or Serve in the *Navy* of *ENGLAND*. A Name ſo highly honoured will remove all Prejudices that may be made upon the Account of my Obſcurity, and when given to any Atample for the Advancement of *Practical Navigation*, will encline every Perſon to receive with Candour, what comes into the World with ſo great a Sanction.

My Lord,

With all humble Submiſſion, I beg Leave

To ſubſcribe my ſelf, your Lordſhip's

moſt Obedient, and moſt humble Servant,

John Collier.

London, Dec: 30*th*, 1725.

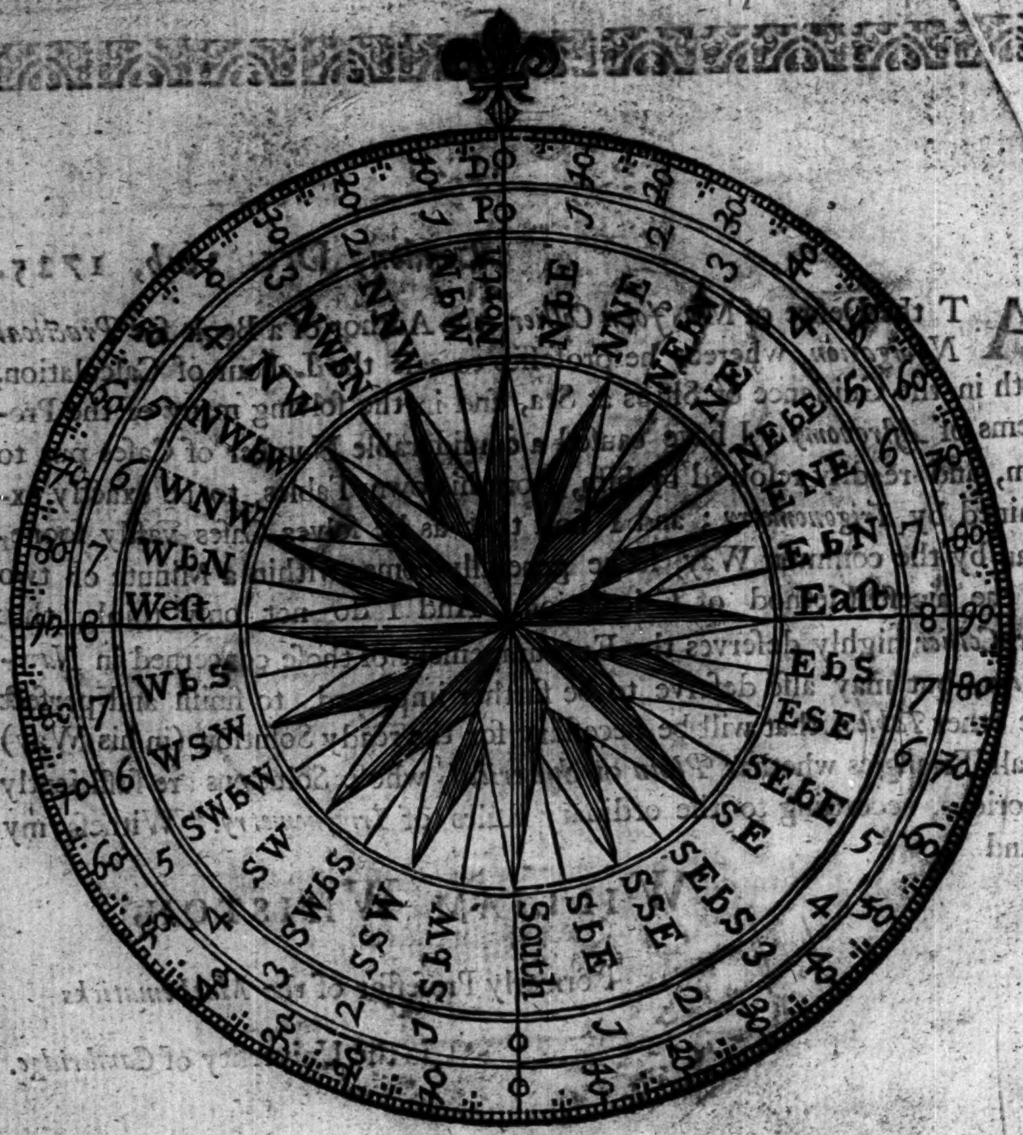
AT the Deſire of Mr. *John Collier*, the Author of a Book for *Practical Navigation*, whereby he profeſſes to eaſe the Labour of Calculation, both in the Guidance of Ships at Sea, and in the ſolving many of the Problems of *Aſtronomy*; I have cauſed a conſiderable Number of Caſes put to him, and readily reſolved by him, from his own Tables, to be exactly examined by *Trigonometry*; and I find that as he ſolves Caſes vaſtly ſooner than by the common Way, ſo he generally comes within a Minute or two of the niceſt Method of Calculation. And I do not only think, that Mr. *Collier* highly deſerves the Encouragement of thoſe concerned in *Navigation*, but may alſo deſerve to be farther imployed, to finiſh and perfect the other *Tables*, that will be neceſſary for the ready Solution (in his Way) of all Triangles whether *Plain* or *Spherical*, whoſe Solutions are ſufficiently laborious, according to the ordinary Rules of *Trigonometry*. Witneſs my Hand

WILLIAM WHISTON,

Formerly Profeſſor of the *Mathematicks*

in the Univerſity of *Cambridge*.

The Figure of the Mariners Compaſs.



The

The Daily Practice of NAVIGATION.

THE *Mariner's Compaſs* being the Sailor's chiefeſt Guide over the tractleſs Ocean, a perfect Knowledge of it, is a great help to a thorough underſtanding the daily Practice of the whole Art of *Navigation*; and therefore, it is not ſufficient for him barely to repeat the Points of the *Compaſs*, as they lie in Order, and that either with or againſt the Sun; but he muſt be able readily to call any Point by its proper Name, as ſoon as he caſts his Eye on the *Compaſs*, and as readily tell what Point is oppoſite to it (which is called boxing the *Compaſs*) and how many Points (or Degrees and Minutes) are contained between it and the Meridian, or North and South Points of the *Compaſs*, becauſe the Periphery (or Circumference) thereof is not only divided into 32 equal Parts (called Points) and each Point ſubdivided into 4 equal Parts (called Quarter Points) but it is alſo (as the Circumference of all other Great Circles are) divided into 360 equal Parts (called Degrees) and each Degree is ſuppoſed to be divided into 60 equal Parts (called Minutes or Miles) the beginning of which Graduation, is always from the Flower-de-luce (or North Point of the *Compaſs*) towards the Eaſt and Weſt Points, and from its oppoſite (or South Point) towards the ſaid Eaſt and Weſt Points, as may be ſeen in the Figure of the *Mariner*'s *Compaſs*. And in this Table of the Inclination, or Angles, the Rhombs (or Points of the *Compaſs*) make with the Meridian, wherein we reckon the Points of the Northern Semicircle from the North.

		Points		D. M.	
North	is	0		00.00	
N. by E. N. by W.	are from the North	1	which is	11.15	
NNE. NNW.		2		22.30	
NE. by N. NW. by N.		3		33.45	
NE. NW.		4		45.00	
NE. by E. NW. by W.		5		56.15	*Note*, D ſignifies degrees M minutes
ENE. WNW.		6		67.30	
E. by N. W. by N.		7		78.45	
Eaſt, Weſt, are from the North and South		8		90.00	
E. by S. W. by S.	are from the South	7	which is	78.45	
ESE. WSW.		6		67.30	
SE. by E. SW. by W.		5		56.15	
SE. SW.		4		45.00	
SE. by S. SW. by S.		3		33.45	
SSE. SSW.		2		22.30	
S. by E. S. by W.		1		11.15	
South	is	0		00.00	

Becauſe the Points in the Southern Semicircle are reckoned from it.

The *Mariner's Compaſs* being perfectly underſtood (according to the foregoing Notices) you muſt obſerve that the *Compaſs* (by which Sailors conduct themſelves over the Ocean) hath only 32 Points drawn thereon, without their Names, or Number of Points from the Meridian, tho its Periphery is divided into Degrees, and noted to every 10, each way, from either End of the Meridian; but this is a uſeleſs Graduation, becauſe experienc'd Sailors know the difficulty of keeping the Ship on the intended Point, in the moſt moderate Weather, and Impoſſibility of performing the ſame to a Degree, in ſuch Weather as they often meet with.

Now, the Figure of the *Compaſs*, on fine Paper, paſted curiouſly on a Chart, with a ſteel Needle touch'd with a Load-ſtone, and a Socket in its middle to ply round on a Pin in the Center of the Box; which Needle is fixt exactly under the Meridian-Line, and equally poiſed, both Chart and Box, to keep them horizontal, with a Glaſs over its Surface, to keep the Wind out of the Box, that the Chart may have a free Pliance; this Compaſs thus accommodated, doth continually ſhew them the Courſe, Rhomb, Point or Angle, that the Head or Stem of the Ship makes with the Meridian, by which they eſtimate their Courſe. But this is not without its Errors.

For the North and South Points thereof, do not exactly lie under the Meridian, but in moſt Places (on the Earth) have a Deviation therefrom, and that ſometimes on the Eaſt-ſide, and ſometimes on the Weſt-ſide of the true Meridian, whoſe Quantity and Quality, if not exactly known, and juſtly allow'd for, may breed a conſiderable Error in the Courſe.

Beſides, this Variation of the Compaſs is not always the ſame in the ſame Place, but at different Times will have different Variations, therefore it hath a Variation of the Variation, which is an Inconveniency to the Sailor; of which, at Large, in its proper Place.

Sometimes they Sail in a Tides or Currents Way, which may take them on the Head or Stern, the Bow, Beam or Quarter, and conſequently they may be flung (or hoiſted) out of their deſign'd Courſe, which is a great Hindrance to a juſt Determination of it; of this likewiſe in Order.

Sometimes they Sail upon a Wind, (or Cloſe-haul'd) that is, as near the Wind as they can lie, with the Sails Rapfull, without Shivering, with the Yards well brac'd, and the Bow-lines well haul'd, and this either with the Starboard or Larboard tacks on Board, and then the Ship does not make her way as good as She looks, but ſwags or falls off to Leeward of the Point ſhe Stems, or Capes on, and that (more or leſs) according to the Height of the Wind, the Growth of the Sea, and the Canvas they have abroad; therefore ſince this Leeway cannot (at all Times) be truly known, the Courſe which ſhould be truely equated by it, muſt be imperfect; a near Eſtimation of which we ſhall teach hereafter.

At other Times they Sail with hard Gales and a hollow Sea, Quartering, and then, altho' the Helmſman uſeth all the Vigilence imaginable, yet he cannot keep her to her Courſe, for as the Squalls take her ſhe will fly up to Windward of it, which is alſo a great Obſtacle to the finding her true Courſe.

Sometimes they Sail right afore the Wind with freſh and ſqually Gales, and a grown Sea, and then ſhe will fly 2 or 3 Points from her Courſe ſometimes on one ſide, and ſometimes on the other ſide of it, according as the Sea may take the Counter, and the Wind the Sails, and this the moſt expert Helmſman cannot avoid, nor the moſt experienc'd Artiſt allow for, and therefore cannot truly State the Courſe.

At other Times it may blow ſo hard that they cannot carry any Sail abroad, but are forced to lie a Try (that is) with the Side of the Ship to the Wind, under the Main-ſail and Mizon, or Mizon ballanc'd, as they find ſhe will lie moſt eaſy, with the Helm a Lee, to keep up her Head to the Wind, which Time ſhe will drive almoſt afore the Wind, altho' her Head will ſometimes come up to 5 Points of the Wind, and fall off to about 8 from it; in theſe 3 laſt Caſes the moſt expert Artiſt will be at a Loſs in computing her true Courſe.

Another Objection agaiſt truly adjuſting the Courſe, may be the Ignorance, and ſometimes the Careleſſneſs or Drowſineſs of the Helmſman, which the Mate of the Watch may be ſometime before he takes Notice of; for the Beſt may often miſtake the *Compaſs*, and ſo may have run upon a wrong Courſe, a Glaſs or more before the Diſcovery be made; this muſt neceſſarily produce an Error in computing the true Courſe.

Theſe Obſtacles being duely conſidered, will diſcloſe the Difficulty the careful Sailor labours under in truly Determining (I ſhould ſay, nearly Eſtimating) the Ships true Courſe, for any ſmall Time, which is one of the moſt uſeful Properties the *Nautical Art* requires.

Now, beſides this *Compaſs* they have a Log-line, and a Half-minute Glaſs, by which they can only gueſs at the Ships true Diſtance run, as will preſently appear.

For this habitable, navigable Body is too large to be meaſured round by any Art we are at preſent Maſters of, and therefore the Circumference of a great Circle thereof muſt be determined by ſome true Meaſure of Part of ſuch Circle, whoſe Ratio to the Whole is found by accurate Obſervation of its correſpondent Part in the Heavens, by the Sun or ſome Cæleſtial Object, Attempts of which have been often made both by Ancient and Modern Mathematicians; but the Anſwers to this moſt requiſite Propoſition are ſo vaſtly different, that there is room for the moſt Credulous to ſcruple.

Anaximander, who firſt attempted this Propoſition, ſays that 50000 *Engliſh* Miles will juſt circumſcribe a great Circle on the Surface of the Earth.

But *Eratoſthenes*, who ſometime after went about the Solution of the ſame, found that 31250 *Engliſh* Miles was the Meaſure of a great Circle on the Terraqueous Globe.

And *Poſſidonius* after him, found that 22500 Statute Miles was the Circumference of a great Circle on the Superficies of the Earth.

Since which ſome *Arabian* Mathematicians performed this Propoſition, and ſaid 20000 of our Miles would Meaſure round the Earth.

After whom came *Snellius* (a *Dutchman*) to the Performance of the ſame, and he ſays, that no leſs than 24000 Miles (of our *Engliſh* Statute Meaſure) can circumſcribe the Globe.

And then (our own Countryman) Mr *Norwood*, by his Experiment, found that there was near 25000 Miles in a great Circle of this habitable and navigable Body; which Meaſure has ſince been nearly confirmed by the *French* Mathematicians, *Picard* and *Caſini*.

Now, as their Concluſions have been different, ſo have the Methods by which they have endeavoured to attain them. For ſome have tryed by the Sun Beams and Shade of a Stile. Others by finding the Quantity of the Angle, made by 2 Lines drawn from the Surface of the Earth to the Top of ſome high Mountain. A Third has been by Eclipſes. A Fourth was by meaſuring directly North or South ſome large Diſtance; the Method of doing this is either with an Inſtrument and Chain, or elſe with a Perambulator (or meaſuring Wheel) which after it is actually taken, muſt with great Care be plann'd upon Paper, allowing for the Variation of the Needle, and all notable Aſcents and Deſcents, with all the Turnings and Windings that happen in the Way; and by this means may be found how many Miles on the Earth will anſwer to one Degree in the Heavens, provided with a good and large Inſtrument you have the Latitude of the two Places whoſe Diſtance you Meaſure.

According to this laſt Method did Mr. *Richard Norwood* (who was an eminent Mathematician, and an experienced Seaman) in the Year 1635, make an Experiment of this Propoſition, by meaſuring the Diſtance between *London* and *York*, and found that one Degree upon Earth did contain 69 $\frac{4}{11}$ *Engliſh* Miles, (each Mile containing 5280 *Engliſh* Feet) and the Circumference of the Earth to be 24971 *Engliſh* Miles.

Now, our Sailors reckon there is 360 Degrees round the Earth, each Degree 60 *Engliſh* Miles, and therefore 21600 *Engliſh* Miles round the Earth, which differs from Mr. *Norwood*'s Experiment 3371 Miles in the Periphery. And then they thus reckon,

That as half a Minute (the Time they are heaving the Log) is the One Hundred and Twentieth Part of an Hour; ſo 44 Feet (which is the One Hundred and Twentieth Part of a Mile) ſhould be the Diſtance between the Knots on the Log-line, which is much ſhort of Mr. *Norwood*'s Experiment, which ſhould be 50 Feet aſunder; and they are now ſo bigotted to Cuſtom, as to ſplice the Knots only 42 Feet or 7 Fathom aſunder, and therefore their Glaſſes ſhould be no more than 26 Seconds of Time, and Two Tenths of a Second, tho' they generally are 28 Seconds, and ſometimes more.

Again, Suppoſe they have exactly Half-minute Glaſſes, and the Line to be exactly Knotted according to the true Meaſure of the Spherical Surface of the Earth, yet even then they could not know the true Run of the Ship, becauſe it's wholly impoſible to juſtly allow for all the Squalls and Lulls that may happen between the Times of heaving the Log.

Since therefore neither the Courſe the Ship hath made Good, nor the Diſtance ſhe hath Run, can be exactly known by the moſt careful Sailor, this requiſite Propoſition is not ſo careleſly to be run over, as it is in moſt Authors on this Subject of *Navigation*. Before which can be Illuſtrated you muſt be Maſter of the following Table, of the Difference of Latitude and Departure from the Meridian, in Minutes and Tenth of a Minute, to every 21 Minutes of the Quadrant, which is the Two and Thirtieth Part of one Point of the *Mariner's Compaſs*; for the exact Working of a Traverſe, and all the Practical Problems in *Navigation* and *Nautical Aſtronomy*, only by Inſpection.

¼ Point

Diſtanc	Qu. 1 —		Qu. 1 +		Qu. 2 —		Qu. 2 +		Qu. 3		Qu. 4 —		Qu. 4 +		Qu. 5	
	00d 21m		00d 42m		01d 03m		1d 24m		01d 45m		02d 07m		02d 28m		02d 49m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	01.0	00.0	01.0	00.0	01.0	00.0	01.0	00.0	01.0	00.0	01.0	00.0	01.0	00.0	01.0	00.0
2	02.0	00.0	02.0	00.0	02.0	00.0	02.0	00.0	02.0	00.1	02.0	00.1	02.0	00.1	02.0	00.1
3	03.0	00.0	03.0	00.0	03.0	00.1	03.0	00.1	03.0	00.1	03.0	00.1	03.0	00.1	03.0	00.1
4	04.0	00.0	04.0	00.0	04.0	00.1	04.0	00.1	04.0	00.1	04.0	00.1	04.0	00.2	04.0	00.2
5	05.0	00.0	05.0	00.1	05.0	00.1	05.0	00.1	05.0	00.2	05.0	00.2	05.0	00.2	05.0	00.2
6	06.0	00.0	06.0	00.1	06.0	00.1	06.0	00.1	06.0	00.2	06.0	00.2	06.0	00.3	06.0	00.3
7	07.0	00.0	07.0	00.1	07.0	00.1	07.0	00.2	07.0	00.2	07.0	00.3	07.0	00.3	07.0	00.3
8	08.0	00.1	08.0	00.1	08.0	00.1	08.0	00.2	08.0	00.2	08.0	00.3	08.0	00.3	08.0	00.4
9	09.0	00.1	09.0	00.1	09.0	00.2	09.0	00.2	09.0	00.3	09.0	00.3	09.0	00.4	09.0	00.4
10	10.0	00.1	10.0	00.1	10.0	00.2	10.0	00.2	10.0	00.3	10.0	00.4	10.0	00.4	10.0	00.5
11	11.0	00.1	11.0	00.1	11.0	00.2	11.0	00.3	11.0	00.3	11.0	00.4	11.0	00.5	11.0	00.5
12	12.0	00.1	12.0	00.1	12.0	00.2	12.0	00.3	12.0	00.4	12.0	00.4	12.0	00.5	12.0	00.6
13	13.0	00.1	13.0	00.2	13.0	00.2	13.0	00.3	13.0	00.4	13.0	00.5	13.0	00.5	13.0	00.6
14	14.0	00.1	14.0	00.2	14.0	00.3	14.0	00.3	14.0	00.4	14.0	00.5	14.0	00.6	14.0	00.7
15	15.0	00.1	15.0	00.2	15.0	00.3	15.0	00.4	15.0	00.5	15.0	00.6	15.0	00.6	15.0	00.7
16	16.0	00.1	16.0	00.2	16.0	00.3	16.0	00.4	16.0	00.5	16.0	00.6	16.0	00.7	16.0	00.8
17	17.0	00.1	17.0	00.2	17.0	00.3	17.0	00.4	17.0	00.5	17.0	00.6	17.0	00.7	17.0	00.8
18	18.0	00.1	18.0	00.2	18.0	00.3	18.0	00.4	18.0	00.5	18.0	00.7	18.0	00.8	18.0	00.9
19	19.0	00.1	19.0	00.2	19.0	00.3	19.0	00.5	19.0	00.6	19.0	00.7	19.0	00.8	19.0	00.9
20	20.0	00.1	20.0	00.2	20.0	00.4	20.0	00.5	20.0	00.6	20.0	00.7	20.0	00.9	20.0	01.0
21	21.0	00.1	21.0	00.3	21.0	00.4	21.0	00.5	21.0	00.6	21.0	00.8	21.0	00.9	21.0	01.0
22	22.0	00.1	22.0	00.3	22.0	00.4	22.0	00.5	22.0	00.7	22.0	00.8	22.0	00.9	22.0	01.1
23	23.0	00.1	23.0	00.3	23.0	00.4	23.0	00.6	23.0	00.7	23.0	00.8	23.0	01.0	23.0	01.1
24	24.0	00.1	24.0	00.3	24.0	00.4	24.0	00.6	24.0	00.7	24.0	00.9	24.0	01.0	24.0	01.2
25	25.0	00.1	25.0	00.3	25.0	00.5	25.0	00.6	25.0	00.8	25.0	00.9	25.0	01.1	25.0	01.2
26	26.0	00.2	26.0	00.3	26.0	00.5	26.0	00.6	26.0	00.8	26.0	01.0	26.0	01.1	26.0	01.3
27	27.0	00.2	27.0	00.3	27.0	00.5	27.0	00.7	27.0	00.8	27.0	01.0	27.0	01.2	27.0	01.3
28	28.0	00.2	28.0	00.3	28.0	00.5	28.0	00.7	28.0	00.9	28.0	01.0	28.0	01.2	28.0	01.4
29	29.0	00.2	29.0	00.3	29.0	00.5	29.0	00.7	29.0	00.9	29.0	01.1	29.0	01.2	29.0	01.4
30	30.0	00.2	30.0	00.4	30.0	00.5	30.0	00.7	30.0	00.9	30.0	01.1	30.0	01.3	30.0	01.5
31	31.0	00.2	31.0	00.4	31.0	00.6	31.0	00.8	31.0	00.9	31.0	01.1	31.0	01.3	30.9	01.5
32	32.0	00.2	32.0	00.4	32.0	00.6	32.0	00.8	32.0	01.0	32.0	01.2	32.0	01.4	31.9	01.6
33	33.0	00.2	33.0	00.4	33.0	00.6	33.0	00.8	33.0	01.0	33.0	01.2	33.0	01.4	32.9	01.6
34	34.0	00.2	34.0	00.4	34.0	0.6	34.0	00.8	34.0	01.0	34.0	01.3	34.0	01.5	33.9	01.7
35	35.0	00.2	35.0	00.4	35.0	00.6	35.0	00.9	35.0	01.1	35.0	01.3	35.0	01.5	34.9	01.7
36	36.0	00.2	36.0	00.4	36.0	00.6	36.0	00.9	36.0	01.1	36.0	01.3	36.0	01.5	35.9	01.8
37	37.0	00.2	37.0	00.4	37.0	00.7	37.0	00.9	37.0	01.1	37.0	01.4	37.0	01.6	36.9	01.8
38	38.0	00.2	38.0	00.5	38.0	00.7	38.0	00.9	38.0	01.2	38.0	01.4	38.0	01.6	37.9	01.9
39	39.0	00.2	39.0	00.5	39.0	00.7	39.0	01.0	39.0	01.2	39.0	01.4	39.0	01.7	38.9	01.9
40	40.0	00.2	40.0	00.5	40.0	00.7	40.0	01.0	40.0	01.2	40.0	01.5	40.0	01.7	39.9	02.0
41	41.0	00.2	41.0	00.5	41.0	00.7	41.0	01.0	41.0	01.3	41.0	01.5	41.0	01.8	40.9	02.0
42	42.0	00.3	42.0	00.5	42.0	00.8	42.0	01.0	42.0	01.3	42.0	01.5	42.0	01.8	41.9	02.1
43	43.0	00.3	43.0	00.5	43.0	00.8	43.0	01.0	43.0	01.3	43.0	01.6	43.0	01.8	42.9	02.1
44	44.0	00.3	44.0	00.5	44.0	00.8	44.0	01.1	44.0	01.3	44.0	01.6	44.0	01.9	43.9	02.2
45	45.0	00.3	45.0	00.5	45.0	00.8	45.0	01.1	45.0	01.4	45.0	01.7	44.9	01.9	44.9	02.2
46	46.0	00.3	46.0	00.6	46.0	00.8	46.0	01.1	46.0	01.4	46.0	01.7	45.9	02.0	45.9	02.2
47	47.0	00.3	47.0	00.6	47.0	00.8	47.0	01.1	47.0	01.4	47.0	01.7	46.9	02.0	46.9	02.3
48	48.0	00.3	48.0	00.6	48.0	0.9	48.0	01.2	48.0	01.5	48.0	01.8	47.9	02.1	47.9	02.3
49	49.0	00.3	49.0	00.6	49.0	00.9	49.0	01.2	49.0	01.5	49.0	01.8	48.9	02.1	48.9	02.4
50	50.0	00.3	50.0	00.6	50.0	00.9	50.0	01.2	50.0	01.5	50.0	01.8	49.9	02.2	49.9	02.4
Diſtanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*De*	*Lat*	*Dep*	*Lat*
	89d 39m		89d 18m		88d 57m		88d 36m		88d 15m		87d 53m		87d 32m		87d 11m	
	Q 16650		Qu.8325		Qu.5550		Qu.4162		Qu.3222		Qu.2700		Qu.2323		Qu.2039	

7¾ Points

1¼ Point

Qu.1 —		Qu.1 +		Qu.2 —		Qu.2 +		Qu. 3		Qu.4 —		Qu.4 +		Qu. 5		Diſtance.
00d 21m		00d 42m		01d 03m		01d 24m		01d 45m		02d 07m		02d 28m		02d 49m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
51.0	00.3	51.0	00.6	51.0	00.9	51.0	01.2	51.0	01.6	51.0	01.9	50.9	02.2	50.9	02.5	51
52.0	00.3	52.0	00.6	52.0	00.9	52.0	01.3	52.0	01.6	52.0	01.9	51.9	02.2	51.9	02.5	52
53.0	00.3	53.0	00.6	53.0	01.0	53.0	01.3	53.0	01.6	53.0	02.0	52.9	02.3	52.9	02.6	53
54.0	00.3	54.0	00.6	54.0	01.0	54.0	01.3	54.0	01.6	54.0	02.0	53.9	02.3	53.9	02.6	54
55.0	00.3	55.0	00.7	55.0	01.0	55.0	01.3	55.0	01.7	55.0	02.0	54.9	02.4	54.9	02.7	55
56.0	00.3	56.0	00.7	56.0	01.0	56.0	01.4	56.0	01.7	56.0	02.1	55.9	02.4	55.9	02.7	56
57.0	00.3	57.0	00.7	57.0	01.0	57.0	01.4	57.0	01.7	56.9	02.1	56.9	02.5	56.9	02.8	57
58.0	00.3	58.0	00.7	58.0	01.0	58.0	01.4	58.0	01.8	57.9	02.1	57.9	02.5	57.9	02.8	58
59.0	00.3	59.0	00.7	59.0	01.1	59.0	01.4	59.0	01.8	58.9	02.2	58.9	02.5	58.9	02.9	59
60.0	00.4	60.0	00.7	60.0	01.1	60.0	01.5	60.0	01.8	59.9	02.2	59.9	02.6	59.9	02.9	60
61.0	00.4	61.0	00.7	61.0	01.1	61.0	01.5	61.0	01.9	60.9	02.3	60.9	02.6	60.9	03.0	61
62.0	00.4	62.0	00.7	62.0	01.1	62.0	01.5	62.0	01.9	61.9	02.3	61.9	02.7	61.9	03.0	62
63.0	00.4	63.0	00.8	63.0	01.1	63.0	01.5	63.0	01.9	62.9	02.3	62.9	02.7	62.9	03.1	63
64.0	00.4	64.0	00.8	64.0	01.2	64.0	01.6	64.0	02.0	63.9	02.4	63.9	02.8	63.9	03.1	64
65.0	00.4	65.0	00.8	65.0	01.2	65.0	01.6	65.0	02.0	64.9	02.4	64.9	02.8	64.9	03.2	65
66.0	00.4	66.0	00.8	66.0	01.2	66.0	01.6	66.0	02.0	65.9	02.4	65.9	02.8	65.9	03.2	66
67.0	00.4	67.0	00.8	67.0	01.2	67.0	01.6	67.0	02.0	66.9	02.5	66.9	02.9	66.9	03.3	67
68.0	00.4	68.0	00.8	68.0	01.2	68.0	01.7	68.0	02.1	67.9	02.5	67.9	02.9	67.9	03.3	68
69.0	00.4	69.0	00.8	69.0	01.3	69.0	01.7	69.0	02.1	68.9	02.6	68.9	03.0	68.9	03.4	69
70.0	00.4	70.0	00.8	70.0	01.3	70.0	01.7	69.9	02.1	69.9	02.6	69.9	03.0	69.9	03.4	70
71.0	00.4	71.0	00.9	71.0	01.3	71.0	01.7	70.9	02.2	70.9	02.6	70.9	03.0	70.9	03.5	71
72.0	00.4	72.0	00.9	72.0	01.3	72.0	01.8	71.9	02.2	71.9	02.7	71.9	03.1	71.9	03.5	72
73.0	00.4	73.0	00.9	73.0	01.3	73.0	01.8	72.9	02.2	72.9	02.7	72.9	03.1	72.9	03.6	73
74.0	00.4	74.0	00.9	74.0	01.3	74.0	01.8	73.9	02.3	73.9	02.7	73.9	03.2	73.9	03.6	74
75.0	00.5	75.0	00.9	75.0	01.4	75.0	01.8	74.9	02.3	74.9	02.8	74.9	03.2	74.9	03.7	75
76.0	00.5	75.9	00.9	76.0	01.4	76.0	01.9	75.9	02.3	75.9	02.8	75.9	03.3	75.9	03.7	76
77.0	00.5	76.9	00.9	77.0	01.4	77.0	01.9	76.9	02.4	76.9	02.8	76.9	03.3	76.9	03.8	77
78.0	00.5	77.9	00.9	78.0	01.4	78.0	01.9	77.9	02.4	77.9	02.9	77.9	03.3	77.9	03.8	78
79.0	00.5	78.9	00.9	79.0	01.4	79.0	01.9	78.9	02.4	78.9	02.9	78.9	03.4	78.9	03.9	79
80.0	00.5	79.9	01.0	80.0	01.4	80.0	01.9	79.9	02.4	79.9	03.0	79.9	03.4	79.9	03.9	80
81.0	00.5	80.9	01.0	81.0	01.5	81.0	02.0	80.9	02.5	80.9	03.0	80.9	03.5	80.9	04.0	81
82.0	00.5	81.9	01.0	82.0	01.5	82.0	02.0	81.9	02.5	81.9	03.0	81.9	03.5	81.9	04.0	82
83.0	00.5	82.9	01.0	83.0	01.5	83.0	02.0	82.9	02.5	82.9	03.1	82.9	03.6	82.9	04.1	83
84.0	00.5	83.9	01.0	84.0	01.5	84.0	02.0	83.9	02.6	83.9	03.1	83.9	03.6	83.9	04.1	84
85.0	00.5	84.9	01.0	85.0	01.5	85.0	02.1	84.9	02.6	84.9	03.1	84.9	03.7	84.9	04.2	85
86.0	00.5	85.9	01.0	86.0	01.5	86.0	02.1	85.9	02.6	85.9	03.2	85.9	03.7	85.9	04.2	86
87.0	00.5	86.9	01.0	87.0	01.6	87.0	02.1	86.9	02.7	86.9	03.2	86.9	03.7	86.9	04.3	87
88.0	00.5	87.9	01.1	88.0	01.6	88.0	02.1	87.9	02.7	87.9	03.2	87.9	03.8	87.9	04.3	88
89.0	00.5	88.9	01.1	89.0	01.6	89.0	02.2	88.9	02.7	88.9	03.3	88.9	03.8	88.9	04.4	89
90.0	00.5	89.9	01.1	90.0	01.6	89.9	02.2	89.9	02.7	89.9	03.3	89.9	03.9	89.9	04.4	90
91.0	00.6	90.9	01.1	90.9	01.6	90.9	02.2	90.9	02.8	90.9	03.4	90.9	03.9	90.9	04.5	91
92.0	00.6	91.9	01.1	91.9	01.7	91.9	02.2	91.9	02.8	91.9	03.4	91.9	04.0	91.9	04.5	92
93.0	00.6	92.9	01.1	92.9	01.7	92.9	02.3	92.9	02.8	92.9	03.4	92.9	04.0	92.9	04.6	93
94.0	00.6	93.9	01.1	93.9	01.7	93.9	02.3	93.9	02.9	93.9	03.5	93.9	04.0	93.9	04.6	94
95.0	00.6	94.9	01.1	94.9	01.7	94.9	02.3	94.9	02.9	94.9	03.5	94.9	04.1	94.9	04.7	95
96.0	00.6	95.9	01.2	95.9	01.7	95.9	02.3	95.9	02.9	95.9	03.5	95.9	04.1	95.9	04.7	96
97.0	00.6	96.9	01.2	96.9	01.7	96.9	02.4	96.9	03.0	96.9	03.6	96.9	04.2	96.9	04.8	97
98.0	00.6	97.9	01.2	97.9	01.8	97.9	02.4	97.9	03.0	97.9	03.6	97.9	04.2	97.9	04.8	98
99.0	00.6	98.9	01.2	98.9	01.8	98.9	02.4	98.9	03.0	98.9	03.7	98.9	04.3	98.9	04.9	99
99.9	00.6	99.9	01.2	99.9	01.8	99.9	02.4	99.9	03.1	99.9	03.7	99.9	04.3	99.9	04.9	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Diſtance.
89d 39m		89d 18m		88d 57m		88d 36m		88d 15m		87d 53m		87d 32m		87d 11m		
Q.16650		Qu.8325		Qu.5550		Qu.4162		Qu.3222		Qu.2700		Qu.2323		Qu.2039		

7¾ Pts.

Diſtanc	Qu.6		Qu.6 +		Qu. 7—		Qu. 7+		Qu. 8		Qu. 9—		Qu. 9+		Qu. 10—	
	03d 10m		03d 31m		03d 52m		04d 13m		04d 34m		04d 55m		05d 16m		05d 37m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1
2	02.0	00.1	02.0	00.1	02.0	00.1	02.0	00.1	02.0	00.2	02.0	00.2	02.0	00.2	02.0	00.2
3	03.0	00.2	03.0	00.2	03.0	00.2	03.0	00.2	03.0	00.2	03.0	00.3	03.0	00.3	03.0	00.3
4	04.0	00.2	04.0	00.2	04.0	00.3	04.0	00.3	04.0	00.3	04.0	00.3	04.0	00.4	04.0	00.4
5	05.0	00.3	05.0	00.3	05.0	00.3	05.0	00.4	05.0	00.4	05.0	00.4	05.0	00.5	05.0	00.5
6	06.0	00.3	06.0	00.4	06.0	00.4	06.0	00.4	06.0	00.5	06.0	00.5	06.0	00.6	06.0	00.6
7	07.0	00.4	07.0	00.4	07.0	00.5	07.0	00.5	07.0	00.6	07.0	00.6	07.0	00.6	07.0	00.7
8	08.0	00.4	08.0	00.5	08.0	00.5	08.0	00.6	08.0	00.6	08.0	00.7	08.0	00.7	08.0	00.8
9	09.0	00.5	09.0	00.6	09.0	00.6	09.0	00.7	09.0	00.7	09.0	00.8	09.0	00.8	09.0	00.9
10	10.0	00.6	10.0	00.6	10.0	00.7	10.0	00.7	10.0	00.8	10.0	00.9	10.0	00.9	09.9	01.0
11	11.0	00.6	11.0	00.7	11.0	00.7	11.0	00.8	11.0	00.9	11.0	00.9	10.9	01.0	10.9	01.1
12	12.0	00.7	12.0	00.7	12.0	00.8	12.0	00.9	12.0	01.0	12.0	01.0	11.9	01.1	11.9	01.2
13	13.0	00.7	13.0	00.8	13.0	00.9	13.0	01.0	13.0	01.0	12.9	01.1	12.9	01.2	12.9	01.3
14	14.0	00.8	14.0	00.9	14.0	00.9	14.0	01.0	13.9	01.1	13.9	01.2	13.9	01.3	13.9	01.4
15	15.0	00.8	15.0	00.9	15.0	01.0	15.0	01.1	14.9	01.2	14.9	01.3	14.9	01.4	14.9	01.5
16	16.0	00.9	16.0	01.0	16.0	01.1	15.9	01.2	15.9	01.3	15.9	01.4	15.9	01.5	15.9	01.6
17	17.0	00.9	17.0	01.0	17.0	01.1	16.9	01.3	16.9	01.4	16.9	01.5	16.9	01.6	16.9	01.7
18	18.0	01.0	18.0	01.1	17.9	01.2	17.9	01.3	17.9	01.4	17.9	01.5	17.9	01.6	17.9	01.8
19	19.0	01.0	19.0	01.2	18.9	01.3	18.9	01.4	18.9	01.5	18.9	01.6	18.9	01.7	18.9	01.9
20	20.0	01.1	20.0	01.2	19.9	01.3	19.9	01.5	19.9	01.6	19.9	01.7	19.9	01.8	19.9	02.0
21	21.0	01.2	21.0	01.3	20.9	01.4	20.9	01.5	20.9	01.7	20.9	01.8	20.9	01.9	20.9	02.1
22	22.0	01.2	21.9	01.3	21.9	01.5	21.9	01.6	21.9	01.8	21.9	01.9	21.9	02.0	21.9	02.2
23	23.0	01.3	22.9	01.4	22.9	01.5	22.9	01.7	22.9	01.8	22.9	02.0	22.9	02.1	22.9	02.2
24	24.0	01.3	23.9	01.5	23.9	01.6	23.9	01.8	23.9	01.9	23.9	02.1	23.9	02.2	23.9	02.3
25	25.0	01.4	24.9	01.5	24.9	01.7	24.9	01.8	24.9	02.0	24.9	02.1	24.9	02.3	24.9	02.4
26	25.9	01.4	25.9	01.6	25.9	01.7	25.9	01.9	25.9	02.1	25.9	02.2	25.9	02.4	25.9	02.5
27	26.9	01.5	26.9	01.7	26.9	01.8	26.9	02.0	26.9	02.2	26.9	02.3	26.9	02.5	26.9	02.6
28	27.9	01.5	27.9	01.7	27.9	01.9	27.9	02.1	27.9	02.2	27.9	02.4	27.9	02.6	27.9	02.7
29	28.9	01.6	28.9	01.8	28.9	02.0	28.9	02.1	28.9	02.3	28.9	02.5	28.9	02.7	28.9	02.8
30	29.9	01.6	29.9	01.8	29.9	02.0	29.9	02.2	29.9	02.4	29.9	02.6	29.9	02.8	29.8	02.9
31	30.9	01.7	30.9	01.9	30.9	02.1	30.9	02.3	30.9	02.5	30.9	02.7	30.9	02.8	30.8	03.0
32	31.9	01.8	31.9	02.0	31.9	02.2	31.9	02.3	31.9	02.6	31.9	02.7	31.9	02.9	31.8	03.1
33	32.9	01.8	32.9	02.0	32.9	02.2	32.9	02.4	32.9	02.6	32.9	02.8	32.9	03.0	32.8	03.2
34	33.9	01.9	33.9	02.1	33.9	02.3	33.9	02.5	33.9	02.7	33.9	02.9	33.9	03.1	33.8	03.3
35	34.9	01.9	34.9	02.1	34.9	02.4	34.9	02.6	34.9	02.8	24.9	03.0	34.8	03.2	34.8	03.4
36	35.9	02.0	35.9	02.2	35.9	02.4	35.9	02.6	35.9	02.9	35.9	03.1	35.8	03.3	35.8	03.5
37	36.9	02.0	36.9	02.3	36.9	02.5	36.9	02.7	36.9	02.9	36.9	03.2	36.8	03.4	36.8	03.6
38	37.9	02.1	37.9	02.3	37.9	02.6	37.9	02.8	37.9	03.0	37.9	03.3	37.8	03.5	37.8	03.7
39	38.9	02.1	38.9	02.4	38.9	02.6	38.9	02.9	38.9	03.1	38.9	03.3	38.8	03.6	38.8	03.8
40	39.9	02.2	39.9	02.5	39.9	02.7	39.9	02.9	39.9	03.2	39.9	03.4	39.8	03.7	39.8	03.9
41	40.9	02.3	40.9	02.5	40.9	02.8	40.9	03.0	40.9	03.3	40.9	03.5	40.8	03.8	40.8	04.0
42	41.9	02.3	41.9	02.6	41.9	02.8	41.9	03.1	41.9	03.3	41.9	03.6	41.8	03.9	41.8	04.1
43	42.9	02.4	42.9	02.6	42.9	02.9	42.9	03.2	42.9	03.4	42.8	03.7	42.8	03.9	42.8	04.2
44	43.9	02.4	43.9	02.7	43.9	03.0	43.9	03.2	43.9	03.5	43.8	03.8	43.8	04.0	43.8	04.3
45	44.9	02.5	44.9	02.8	44.9	03.0	44.9	03.3	44.9	03.6	44.8	03.9	44.8	04.1	44.8	04.4
46	45.9	02.5	45.9	02.8	45.9	03.1	45.9	03.4	45.9	03.7	45.8	03.9	45.8	04.2	45.8	04.5
47	46.9	02.6	46.9	02.9	46.9	03.2	46.9	03.5	46.9	03.7	46.8	04.0	46.8	04.3	46.8	04.6
48	47.9	02.7	47.9	02.9	47.9	03.2	47.9	03.5	47.9	03.8	47.8	04.1	47.8	04.4	47.8	04.7
49	48.9	02.7	48.9	03.0	48.9	03.3	48.9	03.6	48.8	03.9	48.8	04.2	48.8	04.5	48.8	04.8
50	49.9	02.8	49.9	03.1	49.9	03.4	49.9	03.7	49.8	04.0	49.8	04.3	49.8	04.6	49.8	04.9
Diſtanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	86d 50m		86d 29m		86d 08m		85d 47m		85d 26m		85d 05m		84d 44m		84d 23m	
	Qu.1814		Qu.1636		Qu.1489		Qu.1347		Qu 1246		Qu.1158		Qu.1082		Qu.1015	

7½ Pts

Qu.6 —		Qu.6 +		Qu. 7 —		Qu.7 +		Qu. 8		Qu.9 —		Qu.9 +		Qu.10 —		Distance.
03d 10m		03d 31m		03d 52m		04d 13m		04d 34m		04d 55m		05d 16m		05d 37m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
50.9	02.8	50.9	03.1	50.9	03.4	50.9	03.7	50.8	04.1	50.8	04.4	50.8	04.7	50.7	05.0	51
51.9	02.9	51.9	03.2	51.9	03.5	51.9	03.8	51.8	04.1	51.8	04.5	51.8	04.8	51.7	05.1	52
52.9	02.9	52.9	03.3	52.9	03.6	52.9	03.9	52.8	04.2	52.8	04.5	52.8	04.9	52.7	05.2	53
53.9	03.0	53.9	03.3	53.9	03.6	53.9	04.0	53.8	04.3	53.8	04.6	53.8	05.0	53.7	05.3	54
54.9	03.0	54.9	03.4	54.9	03.7	54.9	04.0	54.8	04.4	54.8	04.7	54.8	05.0	54.7	05.4	55
55.9	03.1	55.9	03.4	55.9	03.8	55.9	04.1	55.8	04.5	55.8	04.8	55.8	05.1	55.7	05.5	56
56.9	03.1	56.9	03.5	56.9	03.8	56.8	04.2	56.8	04.5	56.8	04.9	56.8	05.2	56.7	05.6	57
57.9	03.2	57.9	03.6	57.9	03.9	57.8	04.3	57.8	04.6	57.8	05.0	57.8	05.3	57.7	05.7	58
58.9	03.2	58.9	03.6	58.9	04.0	58.8	04.3	58.8	04.7	58.8	05.1	58.8	05.4	58.7	05.8	59
59.9	03.3	59.9	03.7	59.9	04.0	59.8	04.4	59.8	04.8	59.8	05.1	59.7	05.5	59.7	05.9	60
60.9	03.4	60.9	03.7	60.8	04.1	60.8	04.5	60.8	04.9	60.8	05.2	60.7	05.6	60.7	06.0	61
61.9	03.4	61.9	03.8	61.8	04.2	61.8	04.5	61.8	04.9	61.8	05.3	61.7	05.7	61.7	06.1	62
62.9	03.5	62.9	03.9	62.8	04.2	62.8	04.6	62.8	05.0	62.8	05.4	62.7	05.8	62.7	06.2	63
63.9	03.5	63.9	03.9	63.8	04.3	63.8	04.7	63.8	05.1	63.8	05.5	63.7	05.9	63.7	06.3	64
64.9	03.6	64.9	04.0	64.8	04.4	64.8	04.8	64.8	05.2	64.8	05.6	64.7	06.0	64.7	06.4	65
65.9	03.6	65.9	04.1	65.8	04.4	65.8	04.8	65.8	05.3	65.8	05.7	65.7	06.1	65.7	06.5	66
66.9	03.7	66.9	04.1	66.8	04.5	66.8	04.9	66.8	05.3	66.8	05.7	66.7	06.1	66.7	06.6	67
67.9	03.8	67.9	04.2	67.8	04.6	67.8	05.0	67.8	05.4	67.8	05.8	67.7	06.2	67.7	06.7	68
68.9	03.8	68.9	04.2	68.8	04.6	68.8	05.1	68.8	05.5	68.8	05.9	68.7	06.3	68.7	06.8	69
69.9	03.9	69.9	04.3	69.8	04.7	69.8	05.1	69.8	05.6	69.7	06.0	69.7	06.4	69.7	06.9	70
70.9	03.9	70.9	04.3	70.8	04.8	70.8	05.2	70.8	05.6	70.7	06.1	70.7	06.5	70.6	07.0	71
71.9	04.0	71.9	04.4	71.8	04.8	71.8	05.3	71.8	05.7	71.7	06.2	71.7	06.6	71.6	07.1	72
72.9	04.0	72.9	04.5	72.8	04.9	72.8	05.4	72.8	05.8	72.7	06.3	72.7	06.7	72.6	07.1	73
73.9	04.1	73.9	04.5	73.8	05.0	73.8	05.4	73.8	05.9	73.7	06.3	73.7	06.8	73.6	07.2	74
74.9	04.1	74.9	04.6	74.8	05.0	74.8	05.5	74.8	06.0	74.7	06.4	74.7	06.9	74.6	07.3	75
75.9	04.2	75.8	04.7	75.8	05.1	75.8	05.6	75.8	06.0	75.7	06.5	75.7	07.0	75.6	07.4	76
76.8	04.2	76.8	04.7	76.8	05.2	76.8	05.7	76.8	06.1	76.7	06.6	76.7	07.1	76.6	07.5	77
77.8	04.3	77.8	04.8	77.8	05.2	77.8	05.7	77.8	06.2	77.7	06.7	77.7	07.2	77.6	07.6	78
78.8	04.4	78.8	04.8	78.8	05.3	78.8	05.8	78.8	06.3	78.7	06.8	78.7	07.2	78.6	07.7	79
79.8	04.4	79.8	04.9	79.8	05.4	79.8	05.9	79.7	06.4	79.7	06.9	79.7	07.3	79.6	07.8	80
80.8	04.5	80.8	04.9	80.8	05.5	80.8	06.0	80.7	06.4	80.7	06.9	80.7	07.4	80.6	07.9	81
81.8	04.5	81.8	05.0	81.8	05.5	81.8	06.0	81.7	06.5	81.7	07.0	81.7	07.5	81.6	08.0	82
82.8	04.6	82.8	05.1	82.8	05.6	82.8	06.1	82.7	06.6	82.7	07.1	82.7	07.6	82.6	08.1	83
83.8	04.6	83.8	05.1	83.8	05.7	83.8	06.2	83.7	06.7	83.7	07.2	83.7	07.7	83.6	08.2	84
84.8	04.7	84.8	05.2	84.8	05.7	84.8	06.2	84.7	06.8	84.7	07.3	84.7	07.8	84.6	08.3	85
85.8	04.7	85.8	05.3	85.8	05.8	85.8	06.3	85.7	06.8	85.7	07.4	85.6	07.9	85.6	08.4	86
86.8	04.8	86.8	05.3	86.8	05.9	86.8	06.4	86.7	06.9	86.7	07.5	86.6	08.0	86.6	08.5	87
87.8	04.9	87.8	05.4	87.8	05.9	87.8	06.5	87.7	07.0	87.7	07.5	87.6	08.1	87.6	08.6	88
88.8	04.9	88.8	05.5	88.8	06.0	88.8	06.5	88.7	07.1	88.7	07.6	88.6	08.2	88.6	08.7	89
89.8	05.0	89.8	05.5	89.8	06.1	89.8	06.6	89.7	07.2	89.7	07.7	89.6	08.3	89.6	08.8	90
90.8	05.0	90.8	05.6	90.8	06.1	90.8	06.7	90.7	07.2	90.7	07.8	90.6	08.4	90.6	08.9	91
91.8	05.1	91.8	05.6	91.8	06.2	91.8	06.7	91.7	07.3	91.7	07.9	91.6	08.4	91.6	09.0	92
92.8	05.1	92.8	05.7	92.8	06.3	92.8	06.8	92.7	07.4	92.7	08.0	92.6	08.5	92.6	09.1	93
93.8	05.2	93.8	05.8	93.8	06.3	93.8	06.9	93.7	07.5	93.7	08.1	93.6	08.6	93.5	09.2	94
94.8	05.2	94.8	05.8	94.8	06.4	94.8	07.0	94.7	07.6	94.6	08.1	94.6	08.7	94.5	09.3	95
95.8	05.3	95.8	05.9	95.8	06.5	95.8	07.0	95.7	07.6	95.6	08.2	95.6	08.8	95.5	09.4	96
96.8	05.4	96.8	05.9	96.8	06.5	96.7	07.1	96.7	07.7	96.6	08.3	96.6	08.9	96.5	09.5	97
97.8	05.4	97.8	06.0	97.8	06.6	97.7	07.2	97.7	07.8	97.6	08.4	97.6	09.0	97.5	09.6	98
98.8	05.5	98.8	06.1	98.8	06.6	98.7	07.3	98.7	07.9	98.6	08.5	98.6	09.1	98.5	09.7	99
99.8	05.5	99.8	06.1	99.8	06.7	99.7	07.4	99.7	08.0	99.6	08.6	99.6	09.2	99.5	09.8	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance.
86d 50m		85d 29m		86d 08m		85d 47m		85d 26m		85d 05m		84d 44m		84d 23m		
Qu.1814		Qu.1630		Qu.1489		Qu.1347		Qu.1215		Q .1154		Qu.1082		Qu.101		

7½ Pts.

The TRAVERSE TABLE.

Diſtance	Qu. 10+		Qu. 11+		Qu. 12−		Qu. 12+		Qu. 13−		Qu. 13+		Qu. 14+		Qu. 15−	
	05d 59m		06d 20m		06d 41m		07d 02m		07d 23m		07d 44m		08d 05m		08d 26m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1	01.0	00.1
2	02.0	00.2	02.0	00.2	02.0	00.2	02.0	00.2	02.0	00.3	02.0	00.3	02.0	00.3	02.0	00.3
3	03.0	00.3	03.0	00.3	03.0	00.3	03.0	00.4	03.0	00.4	03.0	00.4	03.0	00.4	03.0	00.4
4	04.0	00.4	04.0	00.4	04.0	00.5	04.0	00.5	04.0	00.5	04.0	00.5	04.0	00.6	04.0	00.6
5	05.0	00.5	05.0	00.5	05.0	00.6	05.0	00.6	05.0	00.6	05.0	00.7	04.9	00.7	04.9	00.7
6	06.0	00.6	06.0	00.7	06.0	00.7	06.0	00.7	05.9	00.8	05.9	00.8	05.9	00.8	05.9	00.9
7	07.0	00.7	07.0	00.8	07.0	00.8	06.9	00.9	06.9	00.9	06.9	00.9	06.9	01.0	06.9	01.0
8	08.0	00.8	08.0	00.9	07.9	00.9	07.9	01.0	07.9	01.0	07.9	01.1	07.9	01.1	07.9	01.2
9	08.9	00.9	08.9	01.0	08.9	01.0	08.9	01.1	08.9	01.2	08.9	01.2	08.9	01.3	08.9	01.3
10	09.9	01.0	09.9	01.1	09.9	01.2	09.9	01.2	09.9	01.3	09.9	01.3	09.9	01.4	09.9	01.5
11	10.9	01.1	10.9	01.2	10.9	01.3	10.9	01.3	10.9	01.4	10.9	01.5	10.9	01.5	10.9	01.6
12	11.9	01.2	11.9	01.3	11.9	01.4	11.9	01.5	11.9	01.5	11.9	01.6	11.9	01.7	11.9	01.8
13	12.9	01.3	12.9	01.4	12.9	01.5	12.9	01.6	12.9	01.7	12.9	01.7	12.9	01.8	12.9	01.9
14	13.9	01.4	13.9	01.5	13.9	01.6	13.9	01.7	13.9	01.8	13.9	01.9	13.9	02.0	13.8	02.1
15	14.9	01.5	14.9	01.7	14.9	01.7	14.9	01.8	14.9	01.9	14.9	02.0	14.8	02.1	14.8	02.2
16	15.9	01.6	15.9	01.8	15.9	01.9	15.9	02.0	15.9	02.1	15.9	02.2	15.8	02.2	15.8	02.3
17	16.9	01.8	16.9	01.9	16.9	02.0	16.9	02.1	16.9	02.2	16.8	02.3	16.8	02.4	16.8	02.5
18	17.9	01.9	17.9	02.0	17.9	02.1	17.9	02.2	17.8	02.3	17.8	02.4	17.8	02.5	17.8	02.6
19	18.9	02.0	18.9	02.1	18.9	02.2	18.9	02.3	18.8	02.4	18.8	02.6	18.8	02.7	18.8	02.8
20	19.9	02.1	19.9	02.2	19.9	02.3	19.8	02.4	19.8	02.6	19.8	02.7	19.8	02.8	19.8	02.9
21	20.9	02.2	20.9	02.3	20.9	02.4	20.8	02.6	20.8	02.7	20.8	02.8	20.8	03.0	19.8	03.1
22	21.9	02.3	21.9	02.4	21.9	02.6	21.8	02.7	21.8	02.8	21.8	03.0	21.8	03.1	20.8	03.2
23	22.9	02.4	22.9	02.5	22.9	02.7	22.8	02.8	22.8	03.0	22.8	03.1	22.8	03.2	22.7	03.4
24	23.9	02.5	23.9	02.6	23.8	02.8	23.8	02.9	23.8	03.1	23.8	03.2	23.8	03.4	23.7	03.5
25	24.9	02.6	24.9	02.8	24.8	02.9	24.8	03.1	24.8	03.2	24.8	03.4	24.7	03.5	24.7	03.7
26	25.9	02.7	25.9	02.9	25.8	03.0	25.8	03.2	25.8	03.3	25.8	03.5	25.7	03.7	25.7	03.8
27	26.9	02.8	26.8	03.0	26.8	03.1	26.8	03.3	26.8	03.5	26.7	03.6	26.7	03.8	26.7	04.0
28	27.9	02.9	27.8	03.1	27.8	03.3	27.8	03.4	27.8	03.6	27.7	03.8	27.7	03.9	27.7	04.1
29	28.8	03.0	28.8	03.2	28.8	03.4	28.8	03.5	28.8	03.7	28.7	03.9	28.7	04.1	28.7	04.2
30	29.8	03.1	29.8	03.3	29.8	03.5	29.8	03.7	29.7	03.9	29.7	04.0	29.7	04.2	29.7	04.4
31	30.8	03.2	30.8	03.4	30.8	03.6	30.8	03.8	30.7	04.0	30.7	04.2	30.7	04.4	30.7	04.5
32	31.8	03.3	31.8	03.5	31.8	03.7	31.7	03.9	31.7	04.1	31.7	04.3	31.7	04.5	31.6	04.7
33	32.8	03.4	32.8	03.6	32.8	03.8	32.7	04.0	32.7	04.2	32.7	04.4	32.7	04.6	32.6	04.8
34	33.8	03.5	33.8	03.7	33.8	04.0	33.7	04.2	33.7	04.4	33.7	04.6	33.6	04.8	33.6	05.0
35	34.8	03.6	34.8	03.9	34.8	04.1	34.7	04.3	34.7	04.5	34.7	04.7	34.6	04.9	34.6	05.1
36	35.8	03.7	35.8	04.0	35.8	04.2	35.7	04.4	35.7	04.6	35.7	04.8	35.6	05.1	35.6	05.3
37	36.8	03.9	36.8	04.1	36.7	04.3	36.7	04.5	36.7	04.8	36.7	05.0	36.6	05.2	36.6	05.4
38	37.8	04.0	37.8	04.2	37.7	04.4	37.7	04.7	37.7	04.9	37.6	05.1	37.6	05.3	37.6	05.6
39	38.8	04.1	38.8	04.3	38.7	04.5	38.7	04.8	38.7	05.0	38.6	05.2	38.6	05.5	38.6	05.7
40	39.8	04.2	39.8	04.4	39.7	04.7	39.7	04.9	39.7	05.1	39.6	05.4	39.6	05.6	39.6	05.9
41	40.8	04.3	40.8	04.5	40.7	04.8	40.7	05.0	40.7	05.3	40.6	05.5	40.6	05.8	40.6	06.0
42	41.8	04.4	41.7	04.6	41.7	04.9	41.7	05.1	41.6	05.4	41.6	05.6	41.6	05.9	41.5	06.2
43	42.8	04.5	42.7	04.7	42.7	05.0	42.7	05.3	42.6	05.5	42.6	05.8	42.6	06.0	42.5	06.3
44	43.8	04.6	43.7	04.8	43.7	05.1	43.7	05.4	43.6	05.7	43.6	05.9	43.5	06.2	43.5	06.5
45	44.8	04.7	44.7	05.0	44.7	05.2	44.7	05.5	44.6	05.8	44.6	06.0	44.5	06.3	44.5	06.6
46	45.7	04.8	45.7	05.1	45.7	05.3	45.6	05.6	45.6	05.9	45.6	06.2	45.5	06.5	45.5	06.7
47	46.7	04.9	46.7	05.2	46.7	05.5	46.6	05.8	46.6	06.0	46.6	06.3	46.5	06.6	46.5	06.9
48	47.7	05.0	47.7	05.3	47.7	05.6	47.6	05.9	47.6	06.2	47.6	06.5	47.5	06.7	47.5	07.0
49	48.7	05.1	48.7	05.4	48.7	05.7	48.6	06.0	48.6	06.3	48.6	06.6	48.5	06.9	48.5	07.2
50	49.7	05.2	49.7	05.5	49.7	05.8	49.6	06.1	49.6	06.4	49.5	06.7	49.5	07.0	49.5	07.3
Diſtance	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	84d 01m		83d 40m		83d 19m		82d 58m		82d 37m		82d 16m		81d 55m		81d 34m	
	Qu. 956		Qu. 903		Qu. 856		Qu. 813		Qu. 775		Qu. 734		Qu. 702		Qu. 673	

The TRAVERSE TABLE.

¼ Point

Qu. 10		Qu. 11		Qu. 12		Qu. 12		Qu. 13		Qu. 13		Qu. 14		Qu. [illegible]		Distance
05d 59m		05d 20m		06d 41m		07d 02m		07d 23m		07d 44m		08d 05m		08d 26m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
50.7	05.4	50.7	05.6	50.7	05.9	50.6	06.2	50.6	06.6	50.5	06.9	50.5	07.2	50.4	07.5	51
51.7	05.5	51.7	05.7	51.7	06.0	51.6	06.4	51.6	06.7	51.5	07.0	51.5	07.3	51.4	07.6	52
52.7	05.6	52.7	05.8	52.6	06.2	52.6	06.5	52.6	06.8	52.5	07.1	52.5	07.5	52.4	07.8	53
53.7	05.7	53.7	05.9	53.6	06.3	53.6	06.6	53.6	06.9	53.5	07.3	53.5	07.6	53.4	07.9	54
54.7	05.8	54.7	06.1	54.6	06.4	54.6	06.7	54.5	07.1	54.5	07.4	54.4	07.7	54.4	08.1	55
55.7	05.9	55.7	06.2	55.6	06.5	55.6	06.9	55.5	07.2	55.5	07.5	55.4	07.9	55.4	08.2	56
56.7	06.0	56.7	06.3	56.6	05.6	56.6	07.0	56.5	07.3	56.5	07.7	56.4	08.0	56.4	08.4	57
57.7	06.1	57.7	06.4	57.6	06.7	57.6	07.1	57.5	07.5	57.5	07.8	57.4	08.2	57.4	08.5	58
58.7	06.2	58.6	06.5	58.6	06.9	58.5	07.2	58.5	07.6	58.5	07.9	58.4	08.3	58.4	08.7	59
59.7	06.3	59.6	06.6	59.6	07.0	59.5	07.3	59.5	07.7	59.5	08.1	59.4	08.4	59.3	08.8	60
60.7	06.4	60.6	06.7	60.6	07.1	60.5	07.5	60.5	07.8	60.4	08.2	60.4	08.6	60.3	08.9	61
61.7	06.5	61.6	06.8	61.6	07.2	61.5	07.6	61.5	08.0	61.4	08.3	61.4	08.7	61.3	09.1	62
62.7	06.6	62.6	06.9	62.6	07.3	62.5	07.7	62.5	08.1	62.4	08.5	62.3	08.9	62.3	09.2	63
63.7	06.7	63.6	07.1	63.6	07.4	63.5	07.8	63.5	08.2	63.4	08.6	63.3	09.0	63.3	09.4	64
64.6	06.8	64.6	07.2	64.6	07.6	64.5	08.0	64.5	08.4	64.4	08.7	64.3	09.1	64.3	09.5	65
65.6	06.9	65.6	07.3	65.6	07.7	65.5	08.1	65.5	08.5	65.4	08.9	65.3	09.3	65.3	09.7	66
66.6	07.0	66.6	07.4	66.5	07.8	66.5	08.2	66.4	08.6	66.4	09.0	66.3	09.4	66.3	09.8	67
67.6	07.1	67.6	07.5	67.5	07.9	67.5	08.3	67.4	08.7	67.4	09.1	67.3	09.6	67.3	10.0	68
68.6	07.2	68.6	07.6	68.5	08.0	68.5	08.4	68.4	08.9	68.4	09.3	68.3	09.7	68.2	10.1	69
69.6	07.3	69.6	07.7	69.5	08.1	69.5	08.6	69.4	09.0	69.4	09.4	69.3	09.8	69.2	10.3	70
70.6	07.4	70.6	07.8	70.5	08.3	70.5	08.7	70.4	09.1	70.3	09.5	70.3	10.0	70.2	10.4	71
71.6	07.5	71.6	07.9	71.5	08.4	71.4	08.8	71.4	09.3	71.3	09.7	71.3	10.1	71.2	10.6	72
72.6	07.6	72.6	08.1	72.5	08.5	72.4	08.9	72.4	09.4	72.3	09.8	72.3	10.3	72.2	10.7	73
73.6	07.7	73.6	08.2	73.5	08.6	73.4	09.1	73.4	09.5	73.3	10.0	73.2	10.4	73.2	10.9	74
74.6	07.8	74.6	08.3	74.5	08.7	74.4	09.2	74.4	09.6	74.3	10.1	74.2	10.5	74.2	11.0	75
75.6	07.9	75.5	08.4	75.5	08.8	75.4	09.3	75.4	09.8	75.3	10.2	75.2	10.7	75.2	11.1	76
76.6	08.0	76.5	08.5	76.5	09.0	76.4	09.4	76.4	09.9	76.3	10.4	76.2	10.8	76.2	11.3	77
77.6	08.1	77.5	08.6	77.5	09.1	77.4	09.5	77.3	10.0	77.3	10.5	77.2	11.0	77.1	11.4	78
78.6	08.2	78.5	08.7	78.5	09.2	78.4	09.7	78.3	10.2	78.3	10.6	78.2	11.1	78.1	11.6	79
79.6	08.3	79.5	08.8	79.5	09.3	79.4	09.8	79.3	10.3	79.3	10.8	79.2	11.2	79.1	11.7	80
80.6	08.4	80.5	08.9	80.5	09.4	80.4	09.9	80.3	10.4	80.3	10.9	80.2	11.4	80.1	11.9	81
81.6	08.5	81.5	09.0	81.4	09.5	81.4	10.0	81.3	10.5	81.2	11.0	81.2	11.5	81.1	12.0	82
82.6	08.6	82.5	09.2	82.4	09.7	82.4	10.2	82.3	10.7	82.2	11.2	82.2	11.7	82.1	12.2	83
83.5	08.7	83.5	09.3	83.4	09.8	83.4	10.3	83.3	10.8	83.2	11.3	83.2	11.8	83.1	12.3	84
84.5	08.8	84.5	09.4	84.4	09.9	84.3	10.4	84.3	10.9	84.2	11.4	84.1	12.0	84.1	12.5	85
85.5	08.9	85.5	09.5	85.4	10.0	85.3	10.5	85.3	11.1	85.2	11.6	85.1	12.1	85.1	12.6	86
86.5	09.0	86.5	09.6	86.4	10.1	86.3	10.6	86.3	11.2	86.2	11.7	86.1	12.2	86.0	12.8	87
87.5	09.1	87.5	09.7	87.4	10.2	87.3	10.8	87.3	11.3	87.2	11.8	87.1	12.4	87.0	12.9	88
88.5	09.2	88.5	09.8	88.4	10.4	88.3	10.9	88.3	11.4	88.2	12.0	88.1	12.5	88.0	13.1	89
89.5	09.4	89.5	09.9	89.4	10.5	89.3	11.0	89.2	11.6	89.2	12.1	89.1	12.7	89.0	13.2	90
90.5	09.5	90.4	10.0	90.4	10.6	90.3	11.1	90.2	11.7	90.2	12.2	90.1	12.8	90.0	13.4	91
91.5	09.6	91.4	10.1	91.4	10.7	91.3	11.3	91.2	11.8	91.2	12.4	91.1	12.9	91.0	13.5	92
92.5	09.7	92.4	10.3	92.4	10.8	92.3	11.4	92.2	12.0	92.1	12.5	92.1	13.1	92.0	13.6	93
93.5	09.8	93.4	10.4	93.4	10.9	93.3	11.5	93.2	12.1	93.1	12.6	93.1	13.2	93.0	13.8	94
94.5	09.9	94.4	10.5	94.4	11.0	94.3	11.6	94.2	12.2	94.1	12.8	94.0	13.4	94.0	13.9	95
95.5	10.0	95.4	10.6	95.2	11.2	95.3	11.8	95.2	12.3	95.1	12.9	95.0	13.5	95.0	14.1	96
96.5	10.1	96.4	10.7	96.3	11.3	96.2	11.9	96.2	12.5	96.1	13.0	96.0	13.6	95.9	14.2	97
97.5	10.2	97.4	10.8	97.3	11.4	97.2	12.0	97.2	12.6	97.1	13.2	97.0	13.8	96.9	14.4	98
98.5	10.3	98.4	10.9	98.3	11.5	98.2	12.1	98.2	12.7	98.1	13.3	98.0	13.9	97.9	14.5	99
99.5	10.4	99.4	11.0	99.3	11.6	99.2	12.2	99.2	12.8	99.1	13.5	99.0	14.1	98.9	14.7	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
84d 01m		83d 40m		83d 19m		82d 58m		82d 37m		82d 16m		81d 55m		81d 34m		
Qu. 956		Qu. 993		Qu. 856		Qu. 813		Qu. 775		Qu. 734		Qu. 702		Qu. 673		

7½ Pts.

Distanc	Qu.15+		Qu,16+		Qu.17—		Qu.17+		Qu.18		Qu.18+		Qu.19		Qu.20—	
	08d 47m		09d,08m		09d 30m		09d 51m		10d 12m		10d 33m		10d 54m		11d 15m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2
2	02.0	00.3	02.0	00.3	02.0	00.3	02.0	00.3	02.0	00.4	02.0	00.4	02.0	00.4	02.0	00.4
3	03.0	00.5	03.0	00.5	03.0	00.5	03.0	00.5	03.0	00.5	02.9	00.5	02.9	00.6	02.9	00.6
4	04.0	00.6	03.9	00.6	03.9	00.7	03.9	00.7	03.9	00.7	03.9	00.7	03.9	00.8	03.9	00.8
5	04.9	00.8	04.9	00.8	04.9	00.8	04.9	00.9	04.9	00.9	04.9	00.9	04.9	00.9	04.9	01.0
6	05.9	00.9	05.9	01.0	05.9	01.0	05.9	01.0	05.9	01.1	05.9	01.1	05.9	01.1	05.9	01.2
7	06.9	01.1	06.9	01.1	06.9	01.2	06.9	01.2	06.9	01.2	06.9	01.3	06.9	01.3	06.8	01.4
8	07.9	01.2	07.9	01.3	07.9	01.3	07.9	01.4	07.9	01.4	07.9	01.5	07.9	01.5	07.8	01.6
9	08.9	01.4	08.9	01.4	08.9	01.5	08.9	01.5	08.9	01.6	08.8	01.6	08.8	01.7	08.8	01.8
10	09.9	01.5	09.9	01.6	09.9	01.7	09.9	01.7	09.8	01.8	09.8	01.8	09.8	01.9	09.8	01.9
11	10.9	01.7	10.9	01.7	10.8	01.8	10.8	01.9	10.8	01.9	10.8	02.0	10.8	02.1	10.8	02.1
12	11.9	01.8	11.8	01.9	11.8	02.0	11.8	02.1	11.8	02.1	11.8	02.2	11.8	02.3	11.8	02.3
13	12.8	02.0	12.8	02.1	12.8	02.2	12.8	02.2	12.8	02.3	12.8	02.4	12.8	02.5	12.7	02.5
14	13.8	02.1	13.8	02.2	13.8	02.3	13.8	02.4	13.8	02.5	13.8	02.6	13.7	02.6	13.7	02.7
15	14.8	02.3	14.8	02.4	14.8	02.5	14.8	02.6	14.8	02.7	14.7	02.7	14.7	02.8	14.7	02.9
16	15.8	02.4	15.8	02.5	15.8	02.6	15.8	02.7	15.7	02.8	15.7	02.9	15.7	03.0	15.7	03.1
17	16.8	02.6	16.8	02.7	16.8	02.8	16.8	02.9	16.7	03.0	16.7	03.1	16.7	03.2	16.7	03.3
18	17.8	02.7	17.8	02.9	17.8	03.0	17.7	03.1	17.7	03.2	17.7	03.3	17.7	03.4	17.7	03.6
19	18.8	02.9	18.8	03.0	18.7	03.1	18.7	03.3	18.7	03.4	18.7	03.5	18.7	03.6	18.6	03.7
20	19.8	03.0	19.7	03.2	19.7	03.3	19.7	03.4	19.7	03.5	19.7	03.7	19.6	03.8	19.6	03.9
21	20.8	03.2	20.7	03.3	20.7	03.5	20.7	03.6	20.7	03.7	20.6	03.8	20.6	04.0	20.6	04.1
22	21.7	03.4	21.7	03.5	21.7	03.6	21.7	03.8	21.6	03.9	21.6	04.0	21.6	04.2	21.6	04.3
23	22.7	03.5	22.7	03.7	22.7	03.8	22.7	03.9	22.6	04.1	22.6	04.2	22.6	04.3	22.6	04.5
24	23.7	03.7	23.7	03.8	23.7	04.0	23.6	04.1	23.6	04.2	23.6	04.4	23.6	04.5	23.5	04.7
25	24.7	03.8	24.7	04.0	24.7	04.1	24.6	04.3	24.6	04.4	24.6	04.6	24.6	04.7	24.5	04.9
26	25.7	04.0	25.7	04.2	25.6	04.3	25.6	04.4	25.6	04.6	25.6	04.8	25.5	04.9	25.5	05.1
27	26.7	04.1	26.7	04.3	26.6	04.5	26.6	04.6	26.6	04.8	26.5	04.9	26.5	05.1	26.5	05.3
28	27.7	04.3	27.6	04.5	27.6	04.6	27.6	04.8	27.6	05.0	27.5	05.1	27.5	05.3	27.5	05.5
29	28.7	04.4	28.6	04.6	28.6	04.8	28.6	05.0	28.5	05.1	28.5	05.3	28.5	05.5	28.4	05.7
30	29.6	04.6	29.6	04.8	29.6	05.0	29.6	05.1	29.5	05.3	29.5	05.5	29.5	05.7	29.4	05.8
31	30.6	04.7	30.6	04.9	30.6	05.1	30.5	05.3	30.5	05.5	30.5	05.7	30.5	05.9	30.4	06.0
32	31.6	04.9	31.6	05.1	31.6	05.3	31.5	05.5	31.5	05.7	31.5	05.9	31.4	06.1	31.4	06.2
33	32.6	05.0	32.6	05.2	32.5	05.5	32.5	05.6	32.5	05.8	32.4	06.0	32.4	06.2	32.4	06.4
34	33.6	05.2	33.6	05.4	33.5	05.6	33.5	05.8	33.5	06.0	33.4	06.2	33.4	06.4	33.3	06.6
35	34.6	05.3	34.6	05.6	34.5	05.8	34.5	06.0	34.4	06.2	34.4	06.4	34.4	06.6	34.3	06.8
36	35.6	05.5	35.5	05.7	35.5	06.0	35.5	06.2	35.4	06.4	35.4	06.6	35.4	06.8	35.3	07.0
37	36.6	05.6	36.5	05.9	36.5	06.1	36.5	06.3	36.4	06.5	36.4	06.8	36.3	07.0	36.3	07.2
38	37.6	05.8	37.5	06.0	37.5	06.3	37.4	06.5	37.4	06.7	37.4	07.0	37.3	07.2	37.3	07.4
39	38.5	06.0	38.5	06.2	38.5	06.5	38.4	06.7	38.4	06.9	38.3	07.1	38.3	07.4	38.2	07.6
40	39.5	06.1	39.5	06.3	39.5	06.6	39.4	06.8	39.4	07.1	39.3	07.3	39.3	07.6	39.2	07.8
41	40.5	06.3	40.5	06.5	40.4	06.8	40.4	07.0	40.3	07.2	40.3	07.5	40.3	07.8	40.2	08.0
42	41.5	06.4	41.5	06.6	41.4	07.0	41.4	07.2	41.3	07.4	41.3	07.7	41.2	07.9	41.2	08.2
43	42.5	06.6	42.5	06.8	42.4	07.1	42.4	07.4	42.3	07.6	42.3	07.9	42.2	08.1	42.2	08.4
44	43.5	06.7	43.4	07.0	43.4	07.3	43.4	07.5	43.3	07.8	43.3	08.1	43.2	08.3	43.1	08.6
45	44.5	06.9	44.4	07.1	44.4	07.4	44.3	07.7	44.3	08.0	44.2	08.2	44.2	08.5	44.1	08.8
46	45.5	07.0	45.4	07.3	45.4	07.6	45.3	07.9	45.3	08.1	45.2	08.4	45.2	08.7	45.1	09.0
47	46.4	07.2	46.4	07.4	46.4	07.8	46.3	08.0	46.2	08.3	46.2	08.6	46.2	08.9	46.1	09.2
48	47.4	07.3	47.4	07.6	47.3	07.9	47.3	08.2	47.2	08.5	47.2	08.8	47.1	09.1	47.1	09.4
49	48.4	07.5	48.4	07.8	48.3	08.1	48.3	08.4	48.2	08.7	48.2	09.0	48.1	09.3	48.1	09.6
50	49.4	07.6	49.4	07.9	49.3	08.3	49.3	08.6	49.2	08.9	49.2	09.2	49.1	09.5	49.0	09.8
Distanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	81d 13m		80d 52m		80d 30m		80d 09m		79d 48m		79d 27m		79d 06m		78d 45m	
	Qu. 645		Qu. 620		Qu. 597		Qu. 576		Qu. 556		Qu. 535		Qu. 519		Qu. 503	

7 Pts.

Qu.15+		Qu.16+		Qu.17−		Qu.17+		Qu.18		Qu.18+		Qu.19		Qu.20−		Distance.
08d 47m		09d 08m		09d 30m		09d m51		10d 12m		10d 33m		10d 54m		11d 15m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
50.4	07.8	50.4	08.1	50.3	08.4	50.3	08.7	50.2	09.0	50.1	09.3	50.1	09.6	50.0	10.0	51
51.4	07.9	51.3	08.2	51.3	08.6	51.2	08.9	51.2	09.2	51.1	09.5	51.1	09.8	51.0	10.1	52
52.4	08.1	52.3	08.4	52.3	08.8	52.2	09.1	52.2	09.4	52.1	09.7	52.0	10.0	52.0	10.3	53
53.4	08.2	53.3	08.5	53.3	08.9	53.2	09.2	53.1	09.6	53.1	09.9	53.0	10.2	53.0	10.5	54
54.4	08.4	54.3	08.7	54.2	09.1	54.2	09.4	54.1	09.7	54.1	10.1	54.0	10.4	53.9	10.7	55
55.3	08.6	55.3	08.8	55.2	09.3	55.2	09.6	55.1	09.9	55.1	10.3	55.0	10.6	54.9	10.9	56
56.3	08.7	56.3	09.0	56.2	09.4	56.2	09.8	56.1	10.1	56.0	10.4	56.0	10.8	55.9	11.1	57
57.3	08.9	57.3	09.2	57.2	09.6	57.1	09.9	57.1	10.3	57.0	10.6	57.0	11.0	56.9	11.3	58
58.3	09.0	58.3	09.3	58.2	09.8	58.1	10.1	58.1	10.4	58.0	10.8	57.9	11.2	57.9	11.5	59
59.3	09.2	59.2	09.5	59.2	09.9	59.1	10.3	59.0	10.6	59.0	11.0	58.9	11.3	58.8	11.7	60
60.3	09.3	60.2	09.7	60.2	10.1	60.1	10.4	60.0	10.8	60.0	11.2	59.9	11.5	59.8	11.9	61
61.3	09.5	61.2	09.8	61.2	10.3	61.1	10.6	61.0	11.0	61.0	11.4	60.9	11.7	60.8	12.1	62
62.3	09.6	62.2	10.0	62.1	10.4	62.1	10.8	62.0	11.2	61.9	11.5	61.9	11.9	61.8	12.3	63
63.2	09.8	63.2	10.1	63.1	10.6	63.1	11.0	63.0	11.3	62.9	11.7	62.8	12.1	62.8	12.5	64
64.2	09.9	64.2	10.3	64.1	10.8	64.0	11.1	64.0	11.5	63.9	11.9	63.8	12.3	63.7	12.7	65
65.2	10.1	65.2	10.5	65.1	10.9	65.0	11.3	64.9	11.7	64.9	12.1	64.8	12.5	64.7	12.9	66
66.2	10.2	66.1	10.6	66.1	11.1	66.0	11.5	65.9	11.9	65.9	12.3	65.8	12.7	65.7	13.1	67
67.2	10.4	67.1	10.8	67.1	11.3	67.0	11.6	66.9	12.0	66.9	12.5	66.8	12.9	66.7	13.3	68
68.2	10.5	68.1	11.0	68.1	11.4	68.0	11.8	67.9	12.2	67.8	12.6	67.8	13.0	67.7	13.5	69
69.2	10.7	69.1	11.1	69.0	11.6	69.0	12.0	68.9	12.4	68.8	12.8	68.7	13.2	68.7	13.7	70
70.2	10.8	70.1	11.3	70.0	11.7	70.0	12.1	69.9	12.6	69.8	13.0	69.7	13.4	69.6	13.9	71
71.2	11.0	71.1	11.4	71.0	11.9	70.9	12.3	70.8	12.7	70.8	13.2	70.7	13.6	70.6	14.0	72
72.1	11.1	72.1	11.6	72.0	12.1	71.9	12.5	71.8	12.9	71.8	13.4	71.7	13.8	71.6	14.2	73
73.1	11.3	73.1	11.7	73.0	12.2	72.9	12.7	72.8	13.1	72.7	13.6	72.7	14.0	72.6	14.4	74
74.1	11.4	74.0	11.9	74.0	12.4	73.9	12.8	73.8	13.3	73.7	13.7	73.7	14.2	73.6	14.6	75
75.1	11.6	75.0	12.1	75.0	12.6	74.9	13.0	74.8	13.5	74.7	13.9	74.6	14.4	74.5	14.8	76
76.1	11.7	76.0	12.2	75.9	12.7	75.9	13.2	75.8	13.7	75.7	14.1	75.6	14.6	75.5	15.0	77
77.1	11.9	77.0	12.4	76.9	12.9	76.9	13.4	76.8	13.9	76.7	14.3	76.6	14.7	76.5	15.2	78
78.1	12.1	78.0	12.5	77.9	13.1	77.8	13.5	77.7	14.0	77.7	14.5	77.6	14.9	77.5	15.4	79
79.1	12.2	79.0	12.7	78.9	13.2	78.8	13.7	78.7	14.2	78.6	14.6	78.6	15.1	78.5	15.6	80
80.0	12.4	80.0	12.9	75.9	13.4	79.8	13.9	79.7	14.4	79.6	14.8	79.5	15.3	79.4	15.8	81
81.0	12.5	81.0	13.0	80.9	13.6	80.8	14.0	80.7	14.6	80.6	15.0	80.5	15.5	80.4	16.0	82
82.0	12.7	81.9	13.2	81.9	13.7	81.8	14.2	81.7	14.7	81.6	15.2	81.5	15.7	81.4	16.2	83
83.0	12.8	82.9	13.3	82.8	13.9	82.8	14.4	82.7	14.9	82.6	15.4	82.5	15.9	82.4	16.4	84
84.0	13.0	83.9	13.5	83.8	14.3	83.8	14.6	83.6	15.1	83.6	15.6	83.5	16.1	83.4	16.6	85
85.0	13.1	84.9	13.6	84.8	14.2	84.7	14.7	84.6	15.3	84.5	15.7	84.5	16.3	84.3	16.8	86
86.0	13.3	85.9	13.8	85.8	14.4	85.7	14.9	85.6	15.4	85.5	15.9	85.4	16.5	85.3	17.0	87
87.0	13.4	86.9	14.0	86.8	14.6	86.7	15.1	86.6	15.6	86.5	16.1	86.4	16.6	86.3	17.2	88
87.9	13.6	87.9	14.1	87.8	14.7	87.7	15.2	87.6	15.8	87.5	16.3	87.4	16.8	87.3	17.4	89
88.9	13.7	88.9	14.3	88.8	14.9	88.7	15.4	88.6	15.9	88.5	16.5	88.4	17.0	88.3	17.6	90
88.9	13.9	89.8	14.4	89.8	15.1	89.7	15.6	89.5	16.1	89.5	16.7	89.4	17.2	89.2	17.8	91
90.9	14.0	90.8	14.6	90.7	15.2	90.6	15.8	90.5	16.3	90.4	16.8	90.3	17.4	90.2	18.0	92
91.9	14.2	91.8	14.7	91.7	15.4	91.6	15.9	91.5	16.5	91.4	17.0	91.3	17.6	91.2	18.1	93
92.9	14.4	92.8	14.9	92.7	15.6	92.6	16.1	92.5	16.6	92.4	17.2	92.3	17.8	92.2	18.3	94
93.9	14.5	93.8	15.1	93.7	15.7	93.6	16.3	93.5	16.8	93.4	17.4	93.3	18.0	93.2	18.5	95
94.9	14.7	94.8	15.2	94.7	15.9	94.6	16.4	94.5	17.0	94.4	17.6	94.3	18.2	94.2	18.7	96
95.9	14.8	95.8	15.4	95.7	16.0	95.6	16.6	95.4	17.2	95.4	17.8	95.3	18.3	95.1	18.9	97
96.8	15.0	96.8	15.5	96.7	16.2	96.6	16.8	96.4	17.3	96.3	17.9	96.2	18.5	96.1	19.1	98
97.8	15.1	97.7	15.7	97.6	16.4	97.5	16.9	97.4	17.5	97.3	18.1	97.2	18.7	97.1	19.3	99
98.8	15.3	98.7	15.9	98.6	16.5	98.5	17.1	98.4	17.7	98.3	18.3	98.2	18.9	98.1	19.5	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
81d 13m		80d 52m		80d 30m		80d 09m		79d 48m		79d 27m		79d 06m		78d 45m		
Qu. 645		Qu. 620		Qu. 597		Qu. 576		Qu. 556		Qu. 535		Qu. 519		Qu. 503		

1¼ Pt.

Distanc	Qu.20+		Qu.21+		Qu.22−		Qu 22+		Qu.23+		Qu.24−		Qu.24+		Qu.25+	
	11d 36m		11d 57m		12d 18m		17d 39m		13d 00m		13d 22m		13d 43m		14d 04m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2	01.0	00.2
2	02.0	00.4	02.0	00.4	02.0	00.4	02.0	00.4	01.9	00.4	01.9	00.5	01.9	00.5	01.9	00.5
3	02.9	00.6	02.9	00.6	02.9	00.6	02.9	00.7	02.9	00.7	02.9	00.7	02.9	00.7	02.9	00.7
4	03.9	00.8	03.9	00.8	03.9	00.9	03.9	00.9	03.9	00.9	03.9	00.9	03.9	00.9	03.9	01.0
5	04.9	01.0	04.9	01.0	04.9	01.1	04.9	01.1	04.9	01.1	04.9	01.2	04.9	01.2	04.8	01.2
6	05.9	01.2	05.9	01.2	05.9	01.3	05.9	01.3	05.8	01.3	05.8	01.4	05.8	01.4	05.8	01.5
7	06.9	01.4	06.8	01.4	06.8	01.5	06.8	01.5	06.8	01.6	06.8	01.6	06.8	01.7	06.8	01.7
8	07.8	01.6	07.8	01.7	07.8	01.7	07.8	01.8	07.8	01.8	07.8	01.8	07.8	01.9	07.8	01.9
9	08.8	01.8	08.8	01.9	08.8	01.9	08.8	02.0	08.8	02.0	08.8	02.1	08.7	02.1	08.7	02.2
10	09.8	02.0	09.8	02.1	09.8	02.1	09.8	02.2	09.7	02.2	09.7	02.3	09.7	02.4	09.7	02.4
11	10.8	02.2	10.8	02.3	10.7	02.3	10.7	02.4	10.7	02.5	10.7	02.5	10.7	02.6	10.7	02.7
12	11.8	02.4	11.7	02.5	11.7	02.6	11.7	02.6	11.7	02.7	11.7	02.8	11.7	02.8	11.6	02.9
13	12.7	02.6	12.7	02.7	12.7	02.8	12.7	02.8	12.7	02.9	12.6	03.0	12.6	03.1	12.6	03.2
14	13.7	02.8	13.7	02.9	13.7	03.0	13.7	03.1	13.6	03.1	13.6	03.2	13.6	03.3	13.6	03.4
15	14.7	03.0	14.7	03.1	14.7	03.2	14.6	03.3	14.6	03.4	14.6	03.5	14.6	03.6	14.5	03.6
16	15.7	03.2	15.7	03.3	15.6	03.4	15.6	03.5	15.6	03.6	15.6	03.7	15.5	03.8	15.5	03.9
17	16.7	03.4	16.6	03.5	16.6	03.6	16.6	03.7	16.6	03.8	16.5	03.9	16.5	04.0	16.5	04.1
18	17.6	03.6	17.6	03.7	17.6	03.8	17.6	03.9	17.5	04.0	17.5	04.2	17.5	04.3	17.5	04.4
19	18.6	03.8	18.6	03.9	18.6	04.0	18.5	04.2	18.5	04.2	18.5	04.4	18.5	04.5	18.4	04.6
20	19.6	04.0	19.6	04.1	19.5	04.3	19.5	04.4	19.5	04.5	19.5	04.6	19.4	04.7	19.4	04.9
21	20.6	04.2	20.5	04.3	20.5	04.5	20.5	04.6	20.5	04.7	20.4	04.9	20.4	05.0	20.4	05.1
22	21.6	04.4	21.5	04.6	21.5	04.7	21.5	04.8	21.4	04.9	21.1	05.1	21.4	05.2	21.3	05.3
23	22.5	04.6	22.5	04.8	22.5	04.9	22.4	05.0	22.4	05.2	22.4	05.3	22.3	05.5	22.3	05.6
24	23.5	04.8	23.5	05.0	23.4	05.1	23.4	05.3	23.4	05.4	23.3	05.5	23.3	05.7	23.3	05.8
25	24.5	05.0	24.5	05.2	24.4	05.3	24.4	05.5	24.3	05.6	24.3	05.8	24.3	05.9	24.2	06.1
26	25.5	05.2	25.4	05.4	25.4	05.5	25.4	05.7	25.3	05.8	25.3	06.0	25.3	06.2	25.2	06.3
27	26.4	05.4	26.4	05.6	26.4	05.8	26.3	05.9	26.3	06.1	26.3	06.2	26.2	06.4	26.2	06.6
28	27.4	05.6	27.4	05.8	27.4	06.0	27.3	06.1	27.3	06.3	27.2	05.5	27.2	06.6	27.2	06.8
29	28.4	05.8	28.4	06.0	28.3	06.2	28.3	06.4	28.2	05.5	28.2	06.7	28.2	06.9	28.1	07.0
30	29.4	06.0	29.3	06.2	29.3	06.4	29.3	06.6	29.2	06.7	29.2	06.9	29.1	07.1	29.1	07.3
31	30.4	06.2	30.3	06.4	30.3	06.6	30.2	06.8	30.2	07.0	30.2	07.2	30.1	07.4	30.1	07.5
32	31.3	06.4	31.3	06.6	31.3	06.8	31.2	07.0	31.2	07.2	31.1	07.4	31.1	07.6	31.0	07.8
33	32.3	06.6	32.3	06.8	32.2	07.0	32.2	07.2	32.1	07.4	32.1	07.6	32.1	07.8	32.0	08.0
34	33.3	06.8	33.3	07.0	33.2	07.2	33.2	07.4	33.1	07.6	33.1	07.9	33.0	08.1	33.0	08.3
35	34.3	07.0	34.2	07.2	34.2	07.5	34.1	07.7	34.1	07.9	34.1	08.1	34.0	08.3	33.9	08.5
36	35.3	07.2	35.2	07.5	35.2	07.7	35.1	07.9	35.1	08.1	35.0	08.3	35.0	08.6	34.9	08.7
37	36.2	07.4	36.2	07.7	36.1	07.9	36.1	08.1	36.0	08.3	36.0	08.6	35.9	08.8	35.9	09.0
38	37.2	07.6	37.2	07.9	37.1	08.1	37.1	08.3	37.0	08.5	37.0	08.8	36.9	09.0	36.9	09.2
39	38.2	07.8	38.2	08.1	38.1	08.3	38.1	08.5	38.0	08.8	37.9	09.0	37.9	09.3	37.8	09.5
40	39.2	08.0	39.1	08.3	39.1	08.5	39.0	08.8	39.0	09.0	38.9	09.2	38.9	09.5	38.8	09.7
41	40.2	08.2	40.1	08.5	40.1	08.7	40.0	09.0	39.9	09.2	39.9	09.5	39.8	09.8	39.8	10.0
42	41.1	08.4	41.1	08.7	41.0	08.9	41.0	09.2	40.9	09.4	40.9	09.7	40.8	10.0	40.7	10.2
43	42.1	08.6	42.1	08.9	42.0	09.2	42.0	09.4	41.9	09.7	41.8	09.9	41.8	10.2	41.7	10.4
44	43.1	08.8	43.0	09.1	43.0	09.4	42.9	09.6	42.9	09.9	42.8	10.2	42.7	10.5	42.7	10.7
45	44.1	09.0	44.0	09.3	44.0	09.6	43.9	09.9	43.8	10.1	43.8	10.4	43.7	10.7	43.6	10.9
46	45.1	09.2	45.0	09.5	44.9	09.8	44.9	10.1	44.8	10.3	44.8	10.6	44.7	10.9	44.6	11.2
47	46.0	09.4	46.0	09.7	45.9	10.0	45.9	10.3	45.8	10.6	45.7	10.9	45.7	11.2	45.6	11.4
48	47.0	09.6	47.0	09.9	46.9	10.2	46.8	10.5	46.8	10.8	46.7	11.2	46.6	11.4	46.6	11.7
49	48.0	09.8	47.9	10.1	47.9	10.4	47.8	10.7	47.7	11.0	47.7	11.4	47.6	11.7	47.5	11.9
50	49.0	10.1	48.9	10.4	48.9	10.7	48.8	11.0	48.7	11.2	48.6	11.6	48.6	11.9	48.5	12.2
Distanc	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	78d 24m		78d 03m		77d 42m		77d 21m		77d 00m		76d 38m		76d 17m		75d 56m	
	Qu. 487		Qu. 47		Qu. 458		Qu. 445		Qu. 433		Qu. 421		Qu. 410		Qu. 39	

6¾ Pts

The TRAVERSE TABLE.

1¼ Pt

Qu.20+		Qu.21+		Qu.22—		Qu.22+		Qu.23+		Qu.24—		Q.24+		Q.25+		Distance.
11d 36m		11d 57m		12d 18m		12d 39m		13d 00m		13d 22m		13d 43m		14d 04m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
50.0	10.3	49.5	10.6	49.8	10.9	49.8	11.2	49.7	11.5	49.6	11.8	49.5	12.1	49.5	12.4	51
50.9	10.5	50.9	10.8	50.8	11.1	50.7	11.4	50.7	11.7	50.6	12.1	50.5	12.4	50.4	12.6	52
51.9	10.7	51.5	11.0	51.8	11.3	51.7	11.6	51.6	11.9	51.6	12.3	51.5	12.6	51.4	12.9	53
52.9	10.9	52.8	11.2	52.8	11.5	52.7	11.8	52.6	12.1	52.5	12.5	52.5	12.8	52.4	13.1	54
53.9	11.1	53.8	11.4	53.7	11.7	53.7	12.0	53.6	12.4	53.5	12.8	53.4	13.1	53.3	13.4	55
54.9	11.3	54.8	11.6	54.7	11.9	54.6	12.3	54.5	12.6	54.5	13.0	54.4	13.3	54.3	13.6	56
55.8	11.5	55.8	11.8	55.7	12.1	55.6	12.5	55.5	12.8	55.5	13.2	55.4	13.6	55.3	13.8	57
56.8	11.7	56.7	12.0	56.7	12.4	56.6	12.7	56.5	13.0	56.4	13.4	56.3	13.8	56.3	14.1	58
57.8	11.9	57.7	12.2	57.6	12.6	57.6	12.9	57.5	13.3	57.4	13.6	57.3	14.0	57.2	14.3	59
58.8	12.1	58.7	12.4	58.6	12.8	58.5	13.1	58.5	13.5	58.4	13.9	58.3	14.2	58.2	14.6	60
59.8	12.3	59.7	12.6	59.6	13.0	59.5	13.4	59.4	13.7	59.3	14.1	59.3	14.5	59.2	14.8	61
60.7	12.5	60.7	12.8	60.6	13.2	60.5	13.6	60.4	13.9	60.3	14.3	60.2	14.7	60.1	15.1	62
61.7	12.7	61.6	13.0	61.6	13.4	61.5	13.8	61.4	14.2	61.3	14.6	61.2	15.0	61.1	15.3	63
62.7	12.9	62.6	13.2	62.5	13.6	62.4	14.0	62.3	14.4	62.3	14.8	62.2	15.2	62.1	15.5	64
63.7	13.1	63.6	13.5	63.5	13.8	63.4	14.2	63.3	14.6	63.3	15.0	63.1	15.5	63.0	15.8	65
64.7	13.3	64.6	13.7	64.5	14.1	64.4	14.5	64.3	14.8	64.2	15.2	64.1	15.7	64.0	16.0	66
65.6	13.5	65.5	13.9	65.5	14.3	65.4	14.7	65.3	15.1	65.2	15.5	65.1	15.9	65.0	16.3	67
66.6	13.7	66.5	14.1	66.4	14.5	66.3	14.9	66.2	15.3	66.2	15.7	66.1	16.2	66.0	16.5	68
67.6	13.9	67.5	14.3	67.4	14.7	67.3	15.1	67.2	15.5	67.1	15.9	67.0	16.4	66.9	16.8	69
68.6	14.1	68.5	14.5	68.4	14.9	68.3	15.3	68.2	15.7	68.1	16.2	68.0	16.6	67.9	17.0	70
69.6	14.3	69.5	14.7	69.4	15.1	69.3	15.5	69.2	16.0	69.1	16.4	69.0	16.9	68.9	17.2	71
70.5	14.5	70.4	14.9	70.3	15.3	70.3	15.8	70.1	16.2	70.1	16.6	69.9	17.1	69.8	17.5	72
71.5	14.7	71.4	15.1	71.3	15.5	71.2	16.0	71.1	16.4	71.0	16.9	70.9	17.4	70.8	17.7	73
72.5	14.9	72.4	15.3	72.3	15.8	72.2	16.2	72.1	16.6	72.0	17.1	71.9	17.6	71.8	18.0	74
73.5	15.1	73.4	15.5	73.3	16.0	73.2	16.4	73.1	16.9	73.0	17.3	72.9	17.9	72.7	18.2	75
74.5	15.3	74.4	15.7	74.3	16.2	74.2	16.6	74.0	17.1	73.9	17.6	73.8	18.1	73.7	18.5	76
75.4	15.5	75.3	15.9	75.2	16.4	75.1	16.9	75.0	17.3	74.9	17.8	74.8	18.3	74.7	18.7	77
76.4	15.7	76.3	16.1	76.2	16.6	76.1	17.1	75.0	17.5	75.9	18.0	75.8	18.6	75.7	18.9	78
77.4	15.9	77.3	16.4	77.2	16.8	77.1	17.3	77.0	17.8	76.9	18.3	76.7	18.8	76.6	19.2	79
78.4	16.1	78.3	16.6	78.2	17.0	78.1	17.5	77.9	18.0	77.8	18.5	77.7	19.0	77.6	19.4	80
79.3	16.3	79.2	16.8	79.1	17.3	79.0	17.7	78.9	18.2	78.8	18.7	78.7	19.3	78.6	19.7	81
80.3	16.5	80.2	17.0	80.1	17.5	80.0	18.0	79.9	18.4	79.8	19.0	79.7	19.5	79.5	19.9	82
81.3	16.7	81.2	17.2	81.1	17.7	81.0	18.2	80.9	18.7	80.8	19.2	80.6	19.8	80.5	20.3	83
82.3	16.9	82.2	17.4	82.1	17.9	82.0	18.4	81.8	18.9	81.7	19.4	81.6	20.0	81.5	20.4	84
83.3	17.1	83.2	17.6	83.0	18.1	82.9	18.6	82.8	19.1	82.7	19.7	82.6	20.2	82.4	20.7	85
84.2	17.3	84.1	17.8	84.0	18.3	83.9	18.8	83.8	19.3	83.7	19.9	83.5	20.5	83.4	20.9	86
85.2	17.5	85.1	18.0	85.0	18.5	84.9	19.1	84.8	19.6	84.6	20.1	84.5	20.7	84.4	21.1	87
86.2	17.7	86.1	18.2	86.0	18.7	85.9	19.3	85.7	19.8	85.6	20.3	85.5	20.9	85.4	21.4	88
87.2	17.9	87.1	18.4	87.0	19.0	86.8	19.5	86.7	20.0	86.6	20.6	86.5	21.2	86.3	21.6	89
88.2	18.1	88.0	18.6	87.9	19.2	87.8	19.7	87.7	20.2	87.6	20.8	87.4	21.3	87.3	21.9	90
89.1	18.3	89.0	18.8	88.9	19.4	88.8	19.9	88.7	20.5	88.5	21.0	88.4	21.7	88.3	22.1	91
90.1	18.5	90.0	19.0	89.9	19.6	89.8	20.1	89.6	20.7	89.5	21.3	89.4	21.9	89.2	22.4	92
91.1	18.7	91.0	19.3	90.9	19.8	90.7	20.4	90.6	20.9	90.5	21.5	90.3	22.1	90.2	22.6	93
92.1	18.9	92.0	19.5	91.8	20.0	91.7	20.6	91.6	21.1	91.5	21.7	91.3	22.4	91.2	22.8	94
93.1	19.1	92.9	19.7	92.8	20.2	92.7	20.8	92.6	21.4	92.4	22.0	92.3	22.6	92.1	23.1	95
94.0	19.3	93.9	19.9	93.8	20.4	93.7	21.0	93.5	21.6	93.4	22.2	93.3	22.8	93.1	23.3	96
95.0	19.5	94.9	20.1	94.8	20.7	94.7	21.2	94.5	21.8	94.4	22.4	94.2	23.1	94.1	23.6	97
96.0	19.7	95.9	20.3	95.7	20.9	95.6	21.5	95.5	22.0	95.3	22.6	95.2	23.3	95.1	23.8	98
97.0	19.9	96.9	20.5	96.7	21.1	96.6	21.7	96.5	22.3	96.3	22.9	96.2	23.5	96.0	24.1	99
98.0	20.1	97.8	20.7	97.7	21.3	97.6	21.9	97.4	22.5	97.3	23.1	97.2	23.7	97.0	24.3	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance.
78d 24m		78d 03m		77d 42m		77d 21m		77d 00m		76d 38m		76d 17m		75d 56m		
Qu. 487		Qu. 470		Qu. 458		Qu. 445		Qu. 433		Qu. 421		Qu. 410		Qu. 399		

16¾ Pts

Distanc	Qu.26—		Qu.26+		Qu.27		Qu 28—		Qu.28+		Qu.29—		Qu.29+		Qu.30+	
	14d 25m		14d 46m		15d 07m		15d 28m		15d 49m		16d 10m		16d 31m		16d 52m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	01.0	00.2	01.0	00.3	01.0	00.3	01.0	00.3	01.0	00.3	01.0	00.3	01.0	00.3	01.0	00.3
2	01.9	00.5	01.9	00.5	01.9	00.5	01.9	00.5	01.9	00.5	01.9	00.6	01.9	00.6	01.9	00.6
3	02.9	00.7	02.9	00.8	02.9	00.8	02.9	00.8	02.9	00.3	02.9	00.8	02.9	00.9	02.9	00.9
4	03.9	01.0	03.9	01.0	03.9	01.0	03.9	01.1	03.8	01.1	03.8	01.1	03.8	01.1	03.8	01.2
5	04.8	01.2	04.8	01.3	04.8	01.3	04.8	01.3	04.8	01.4	04.8	01.4	04.8	01.4	04.8	01.5
6	05.8	01.5	05.8	01.5	05.8	01.6	05.8	01.6	05.8	01.6	05.8	01.7	05.8	01.7	05.7	01.7
7	06.8	01.7	06.8	01.8	06.8	01.8	06.7	01.9	06.7	01.9	06.7	01.9	06.7	02.0	06.7	02.0
8	07.7	02.0	07.7	02.0	07.7	02.1	07.7	02.1	07.7	02.2	07.7	02.2	07.7	02.3	07.7	02.3
9	08.7	02.2	08.7	02.3	08.7	02.3	08.7	02.4	08.6	02.5	08.6	02.5	08.6	02.6	08.6	02.6
10	09.7	02.5	09.7	02.6	09.7	02.6	09.6	02.7	09.6	02.7	09.6	02.8	09.6	02.8	09.6	02.9
11	10.7	02.7	10.6	02.8	10.6	02.9	10.6	02.9	10.6	03.0	10.6	03.1	10.5	03.1	10.5	03.2
12	11.6	03.0	11.6	03.1	11.6	03.1	11.6	03.2	11.5	03.3	11.5	03.3	11.5	03.4	11.5	03.5
13	12.6	03.2	12.6	03.3	12.5	03.4	12.5	03.5	12.5	03.5	12.5	03.6	12.5	03.7	12.4	03.8
14	13.6	03.5	13.5	03.6	13.5	03.7	13.5	03.7	13.5	03.8	13.4	03.9	13.4	04.0	13.4	04.1
15	14.5	03.7	14.5	03.8	14.5	03.9	14.5	04.0	14.4	04.1	14.4	04.2	14.4	04.3	14.4	04.4
16	15.5	04.0	15.5	04.1	15.4	04.2	15.4	04.3	15.4	04.4	15.4	04.4	15.3	04.5	15.3	04.6
17	16.5	04.2	16.4	04.3	16.4	04.4	16.4	04.5	16.4	04.6	16.3	04.7	16.3	04.8	16.3	04.9
18	17.4	04.5	17.4	04.6	17.4	04.7	17.4	04.8	17.3	04.9	17.3	05.0	17.3	05.1	17.2	05.2
19	18.4	04.7	18.4	04.8	18.3	05.0	18.3	05.1	18.3	05.2	18.2	05.3	18.2	05.4	18.2	05.5
20	19.4	05.0	19.3	05.1	19.3	05.2	19.3	05.3	19.2	05.5	19.2	05.6	19.2	05.7	19.1	05.8
21	20.3	05.2	20.3	05.4	20.3	05.5	20.2	05.6	20.2	05.7	20.2	05.8	20.1	06.0	20.1	06.1
22	21.3	05.5	21.3	05.6	21.2	05.7	21.2	05.9	21.2	06.0	21.1	06.1	21.1	06.2	21.1	06.4
23	22.3	05.7	22.2	05.9	22.2	06.0	22.2	06.1	22.1	06.3	22.1	06.4	22.1	06.5	22.0	06.7
24	23.2	06.0	23.2	06.1	23.2	06.3	23.1	06.4	23.1	06.5	23.0	06.7	23.0	06.8	23.0	07.0
25	24.2	06.2	24.2	06.4	24.1	06.5	24.1	06.7	24.1	06.8	24.0	07.0	24.0	07.1	23.9	07.3
26	25.2	06.5	25.1	06.6	25.1	06.8	25.1	06.9	25.0	07.1	25.0	07.2	24.9	07.4	24.9	07.5
27	26.1	06.7	26.1	06.9	26.1	07.0	26.0	07.2	26.0	07.4	25.9	07.5	25.9	07.7	25.8	07.8
28	27.1	07.0	27.1	07.1	27.0	07.3	27.0	07.5	26.9	07.6	26.9	07.8	26.9	08.0	26.8	08.1
29	28.1	07.2	28.0	07.4	28.0	07.6	28.0	07.7	27.9	07.9	27.8	08.1	27.8	08.2	27.8	08.4
30	29.1	07.5	29.0	07.7	29.0	07.8	28.9	08.0	28.9	08.2	28.8	08.3	28.8	08.5	28.7	08.7
31	30.0	07.7	30.0	07.9	29.9	08.1	29.9	08.3	29.8	08.5	29.8	08.6	29.7	08.8	29.7	09.0
32	31.0	08.0	31.0	08.2	30.9	08.4	30.8	08.5	30.8	08.7	30.7	08.9	30.7	09.1	30.6	09.3
33	32.0	08.2	31.9	08.4	31.8	08.6	31.8	08.8	31.7	09.0	31.7	09.2	31.6	09.4	31.6	09.6
34	32.9	08.5	32.9	08.7	32.8	08.9	32.8	09.1	32.7	09.3	32.6	09.5	32.6	09.7	32.5	09.9
35	33.9	08.7	33.9	08.9	33.8	09.1	33.7	09.3	33.7	09.5	33.6	09.7	33.6	09.9	33.5	10.2
36	34.9	09.0	34.8	09.2	34.7	09.4	34.7	09.5	34.6	09.8	34.6	10.0	34.5	10.2	34.5	10.4
37	35.8	09.2	35.8	09.4	35.7	09.7	35.7	09.9	35.6	10.1	35.5	10.3	35.5	10.5	35.4	10.7
38	36.8	09.5	36.8	09.7	36.7	09.9	36.6	10.1	36.6	10.4	36.5	10.6	36.4	10.8	36.4	11.0
39	37.8	09.7	37.7	09.9	37.6	10.2	37.6	10.4	37.5	10.6	37.4	10.8	37.4	11.1	37.3	11.3
40	38.7	10.0	38.7	10.2	38.6	10.4	38.6	10.7	38.5	10.9	38.4	11.1	38.4	11.4	38.3	11.6
41	39.7	10.2	39.7	10.5	39.6	10.7	39.5	10.9	39.4	11.2	39.4	11.4	39.3	11.6	39.2	11.9
42	40.7	10.5	40.6	10.7	40.5	11.0	40.5	11.2	40.4	11.5	40.3	11.7	40.3	11.9	40.2	12.2
43	41.6	10.7	41.6	11.0	41.5	11.2	41.5	11.5	41.4	11.7	41.3	11.9	41.2	12.2	41.2	12.5
44	42.6	11.0	42.6	11.2	42.5	11.5	42.4	11.7	42.3	12.0	42.2	12.2	42.2	12.5	42.1	12.8
45	43.6	11.2	43.5	11.5	43.4	11.7	43.4	12.0	43.3	12.3	43.2	12.5	43.2	12.8	43.1	13.1
46	44.5	11.5	44.5	11.7	44.4	12.0	44.3	12.3	44.3	12.5	44.2	12.8	44.1	13.1	44.0	13.3
47	45.5	11.7	45.5	12.0	45.4	12.3	45.3	12.5	45.2	12.8	45.1	13.1	45.1	13.3	45.0	13.6
48	46.5	12.0	46.4	12.2	46.3	12.5	46.3	12.8	46.2	13.1	46.1	13.3	46.0	13.6	45.9	13.9
49	47.5	12.2	47.4	12.5	47.3	12.8	47.2	13.1	47.1	13.4	47.0	13.6	47.0	13.9	46.9	14.2
50	48.4	12.5	48.4	12.8	48.3	13.1	48.2	13.4	48.1	13.7	48.0	13.9	48.0	14.2	47.9	14.5
Distanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	75d 35m		75d 14m		74d 53m		74d 32m		74d 11m		73d 50m		73d 29m		73d 08m	
	Qu. 388		Qu. 379		Qu. 369		Qu. 361		Qu. 352		Qu. 345		Qu. 337		Qu. 330	

6½ Pts.

Qu.26—		Qu.26+		Qu.27		Qu 28—		Qu.28+		Qu.29—		Qu.29+		Qu.30+		Distance
14d 25m		14d 46m		15d 07m		15d 28m		15d 49m		16d 10m		16d 31m		16d 52m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
49.4	12.7	49.3	13.0	49.2	13.3	49.2	13.6	49.1	13.9	49.0	14.2	48.9	14.5	48.8	14.8	51
50.4	13.0	50.3	13.3	50.2	13.6	50.1	13.9	50.9	14.2	49.9	14.4	49.9	14.8	49.8	15.1	52
51.3	13.2	51.3	13.5	51.1	13.8	51.1	14.1	51.0	14.5	50.9	14.7	50.8	15.1	50.7	15.4	53
52.3	13.5	52.2	13.8	52.1	14.1	52.1	14.4	51.9	14.7	51.8	15.0	51.8	15.3	51.7	15.7	54
53.3	13.7	53.2	14.0	53.1	14.4	53.0	14.7	52.9	15.0	52.8	15.3	52.7	15.6	52.6	16.0	55
54.2	14.0	54.2	14.3	54.0	14.6	54.0	14.9	53.9	15.3	53.8	15.6	53.7	15.9	53.6	16.2	56
55.2	14.2	55.1	14.5	55.0	14.9	54.9	15.2	54.8	15.5	54.7	15.8	54.7	16.2	54.6	16.5	57
56.2	14.5	56.1	14.8	56.0	15.1	55.9	15.5	55.8	15.8	55.7	16.1	55.6	16.5	55.5	16.8	58
57.1	14.7	57.1	15.0	56.9	15.4	56.9	15.7	56.7	16.1	56.6	16.4	56.6	16.8	56.5	17.1	59
58.1	14.9	58.0	15.3	57.9	15.7	57.8	16.0	57.7	16.4	57.6	16.7	57.5	17.0	57.4	17.4	60
59.1	15.1	59.0	15.6	58.9	15.9	58.8	16.3	58.7	16.7	58.6	17.0	58.5	17.3	58.4	17.7	61
60.0	15.4	60.0	15.8	59.8	16.2	59.8	16.5	59.6	16.9	59.5	17.2	59.5	17.6	59.3	18.0	62
61.0	15.6	61.0	16.1	60.8	16.4	60.7	16.8	60.6	17.2	60.5	17.5	60.4	17.9	60.3	18.3	63
62.0	15.9	61.9	16.3	61.8	16.7	61.7	17.1	61.6	17.5	61.4	17.8	61.4	18.2	61.3	18.6	64
62.9	16.1	62.9	16.6	62.7	17.0	62.7	17.4	62.5	17.7	62.4	18.1	62.3	18.5	62.2	18.9	65
63.9	16.4	63.9	16.8	63.7	17.2	63.6	17.6	63.5	18.0	63.4	18.3	63.3	18.7	63.2	19.1	66
64.9	16.6	64.8	17.1	64.7	17.5	64.6	17.9	64.5	18.3	64.3	18.6	64.3	19.0	64.1	19.4	67
65.9	16.9	65.8	17.3	65.6	17.8	65.6	18.1	65.4	18.5	65.3	18.9	65.2	19.3	65.1	19.7	68
66.8	17.1	66.8	17.6	66.6	18.0	66.5	18.4	66.4	18.8	66.2	19.2	66.2	19.6	66.0	20.0	69
67.8	17.4	67.7	17.9	67.6	18.3	67.5	18.7	67.3	19.1	67.2	19.5	67.1	19.9	67.0	20.3	70
68.8	17.6	68.7	18.1	68.5	18.5	68.4	18.9	68.3	19.4	68.2	19.7	68.1	20.2	68.0	20.6	71
69.7	17.9	69.7	18.4	69.5	18.8	69.4	19.2	69.3	19.7	69.1	20.0	69.1	20.4	68.9	20.9	72
70.7	18.1	70.6	18.6	70.4	19.1	70.4	19.5	70.2	19.9	70.1	20.3	70.0	20.7	69.9	21.2	73
71.7	18.4	71.6	18.9	71.4	19.3	71.3	19.7	71.2	20.2	71.0	20.6	71.0	21.0	70.8	21.5	74
72.6	18.6	72.6	19.1	72.4	19.6	72.3	20.0	72.2	20.5	72.0	20.8	71.9	21.3	71.8	21.8	75
73.6	18.9	73.5	19.4	73.3	19.8	73.3	20.3	73.1	20.7	73.0	21.1	72.9	21.6	72.7	22.0	76
74.6	19.1	74.5	19.6	74.3	20.1	74.2	20.5	74.1	21.0	73.9	21.4	73.8	21.9	73.7	22.3	77
75.5	19.4	75.5	19.9	75.3	20.4	75.2	20.8	75.0	21.3	74.9	21.7	74.8	22.2	74.7	22.6	78
76.5	19.6	76.4	20.1	76.2	20.6	76.2	21.1	76.0	21.5	75.8	21.9	75.8	22.4	75.6	22.9	79
77.5	19.9	77.4	20.4	77.2	20.9	77.1	21.4	77.0	21.8	76.8	22.2	76.7	22.7	76.6	23.2	80
78.4	20.1	78.4	20.7	78.2	21.1	78.1	21.6	77.9	22.1	77.8	22.5	77.7	23.0	77.5	23.5	81
79.4	20.4	79.3	20.9	79.1	21.4	79.0	21.9	78.9	22.4	78.7	22.8	78.6	23.3	78.5	23.8	82
80.4	20.6	80.3	21.2	80.1	21.7	80.0	22.1	79.8	22.7	79.7	23.1	79.6	23.6	79.4	24.1	83
81.3	20.9	81.3	21.4	81.1	21.9	81.0	22.4	80.8	22.9	80.6	23.3	80.6	23.9	80.4	24.4	84
82.3	21.1	82.2	21.7	82.0	22.2	81.9	22.7	81.8	23.2	81.6	23.6	81.5	24.1	81.4	24.7	85
83.3	21.4	83.2	21.9	83.0	22.5	82.9	22.9	82.7	23.5	82.6	23.9	82.5	24.4	82.3	24.9	86
84.3	21.6	84.2	22.2	84.0	22.7	83.9	23.2	83.7	23.7	83.5	24.2	83.4	24.7	83.3	25.2	87
85.2	21.9	85.1	22.4	84.9	23.0	84.8	23.5	84.7	24.0	84.5	24.4	84.4	25.0	84.2	25.5	88
86.2	22.1	86.1	22.7	85.9	23.2	85.8	23.7	85.6	24.3	85.4	24.7	85.4	25.3	85.2	25.8	89
87.2	22.4	87.0	23.0	86.9	23.4	86.8	24.0	86.6	24.6	86.4	25.0	86.3	25.6	86.1	26.1	90
88.1	22.6	88.0	23.2	87.8	23.8	87.7	24.3	87.5	24.8	87.4	25.3	87.3	25.8	87.1	26.4	91
89.1	22.9	89.0	23.5	88.8	24.0	88.7	24.5	88.5	25.1	88.3	25.6	88.2	26.1	88.1	26.7	92
90.1	23.1	90.0	23.7	89.7	24.3	89.7	24.8	89.5	25.4	89.3	25.8	89.2	26.4	89.0	27.0	93
91.0	23.4	90.9	24.0	90.7	24.5	90.6	25.1	90.4	25.7	90.2	26.1	90.2	26.7	90.0	27.3	94
92.0	23.6	91.9	24.2	91.7	24.8	91.6	25.4	91.4	25.9	91.2	26.4	91.1	27.0	90.9	27.6	95
93.0	23.9	92.9	24.5	92.6	25.1	92.5	25.6	92.4	26.2	92.2	26.7	92.1	27.3	91.9	27.8	96
93.9	24.1	93.8	24.7	93.6	25.3	93.5	25.9	93.3	26.5	93.1	27.0	93.0	27.5	92.8	28.1	97
94.9	24.4	94.8	25.0	94.6	25.6	94.5	26.1	94.3	26.7	94.1	27.2	94.0	27.8	93.8	28.4	98
95.9	24.6	95.8	25.2	95.5	25.8	95.4	26.4	95.2	27.0	95.0	27.5	94.9	28.1	94.8	28.7	99
96.9	24.9	96.7	25.5	96.5	26.1	96.4	26.7	96.2	27.3	96.0	27.8	95.9	28.4	95.7	29.0	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
75d 35m		75d 14m		74d 53m		74d 32m		74d 11m		73d 50m		73d 29m		73d 08m		
Qu. 388		Qu. 379		Qu. 369		Qu. 361		Qu 352		Qu. 345		Qu. 337		Qu. 330		

6¹ Pts.

Distance	Qu. 31 —		Qu. 31 +		Qu. 32 +		Qu. 33 +		Qu. 34 —		Qu. 34 +		Qu. 35 +		Qu. 36 —	
	17d 14m		17d 35m		17d 56m		18d 17m		18d 38m		18d 59m		19d 20m		19d 41m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	01.0	00.3	01.0	00.3	01.0	00.3	01.0	00.3	00.9	00.3	00.9	00.3	00.9	00.3	00.9	00.3
2	01.9	00.6	01.9	00.6	01.9	00.6	01.9	00.6	01.9	00.6	01.9	00.7	01.9	00.7	01.9	00.7
3	02.9	00.9	02.9	00.9	02.9	00.9	02.9	00.9	02.8	01.0	02.8	01.0	02.8	01.0	02.8	01.0
4	03.8	01.2	03.8	01.2	03.8	01.2	03.8	01.3	03.8	01.3	03.8	01.3	03.8	01.3	03.8	01.3
5	04.8	01.5	04.8	01.5	04.8	01.5	04.8	01.6	04.7	01.6	04.7	01.6	04.7	01.7	04.7	01.7
6	05.7	01.8	05.7	01.8	05.7	01.8	05.7	01.9	05.7	01.9	05.7	02.0	05.7	02.0	05.7	02.0
7	06.7	02.1	06.7	02.1	06.7	02.2	06.7	02.2	06.6	02.2	05.6	02.3	06.6	02.3	06.6	02.4
8	07.6	02.4	07.6	02.4	07.6	02.5	07.6	02.5	07.6	02.6	07.6	02.6	07.6	02.6	07.5	02.7
9	08.6	02.7	08.6	02.7	08.6	02.8	08.6	02.8	08.5	02.9	08.5	02.9	08.5	03.0	08.5	03.0
10	09.6	03.0	09.5	03.0	09.5	03.1	09.5	03.1	09.5	03.2	09.5	03.3	09.4	03.3	09.4	03.4
11	10.5	03.3	10.5	03.3	10.5	03.4	10.5	03.5	10.4	03.5	10.4	03.6	10.4	03.6	10.4	03.7
12	11.5	03.6	11.4	03.6	11.4	03.7	11.4	03.8	11.4	03.8	11.4	03.9	11.3	04.0	11.3	04.0
13	12.4	03.8	12.4	03.9	12.4	04.0	12.4	04.1	12.3	04.2	12.3	04.2	12.3	04.3	12.2	04.4
14	13.4	04.1	13.3	04.2	13.3	04.3	13.3	04.4	13.3	04.5	13.2	04.6	13.2	04.6	13.2	04.7
15	14.3	04.4	14.3	04.5	14.3	04.6	14.3	04.7	14.2	04.8	14.2	04.9	14.2	05.0	14.1	05.1
16	15.3	04.7	15.2	04.8	15.2	04.9	15.2	05.0	15.2	05.1	15.1	05.2	15.1	05.3	15.1	05.4
17	16.2	05.0	16.2	05.1	16.2	05.2	16.2	05.3	16.1	05.4	16.1	05.5	16.0	05.6	16.0	05.7
18	17.2	05.3	17.2	05.4	17.1	05.5	17.1	05.7	17.1	05.8	17.0	05.9	17.0	06.0	17.0	06.1
19	18.1	05.6	18.1	05.7	18.1	05.8	18.1	06.0	18.0	06.1	18.0	06.2	17.9	06.3	17.9	06.4
20	19.1	05.9	19.1	06.0	19.0	06.1	19.0	06.3	19.0	06.4	18.9	06.5	18.9	06.6	18.8	06.7
21	20.1	06.2	20.0	06.3	20.0	06.5	20.0	06.6	19.9	06.7	19.9	06.8	19.8	07.0	19.8	07.1
22	21.0	06.5	21.0	06.6	20.9	06.8	20.9	06.9	20.9	07.0	20.8	07.2	20.8	07.3	20.7	07.4
23	22.0	06.7	21.9	06.9	21.9	07.1	21.9	07.2	21.8	07.4	21.8	07.5	21.7	07.6	21.7	07.8
24	22.9	07.0	22.9	07.2	22.8	07.4	22.8	07.5	22.8	07.7	22.7	07.8	22.7	07.9	22.6	08.1
25	23.9	07.4	23.8	07.6	23.8	07.7	23.8	07.9	23.7	08.0	23.7	08.1	23.6	08.3	23.6	08.4
26	24.8	07.7	24.8	07.9	24.7	08.0	24.7	08.2	24.6	08.3	24.6	08.5	24.5	08.6	24.5	08.8
27	25.8	08.0	25.7	08.2	25.7	08.3	25.7	08.5	25.6	08.6	25.5	08.8	25.5	08.9	25.4	09.1
28	26.7	08.3	26.7	08.5	26.6	08.6	26.6	08.8	26.5	09.0	26.5	09.1	26.4	09.3	26.4	09.4
29	27.7	08.6	27.6	08.8	27.6	08.9	27.6	09.1	27.5	09.3	27.4	09.4	27.4	09.6	27.3	09.8
30	28.7	08.9	28.6	09.1	28.5	09.2	28.5	09.4	28.4	09.6	28.4	09.8	28.3	09.9	28.3	10.1
31	29.6	09.2	29.5	09.4	29.5	09.5	29.5	09.7	29.4	09.9	29.3	10.1	29.3	10.3	29.2	10.4
32	30.6	09.5	30.5	09.7	30.4	09.9	30.4	10.0	30.3	10.2	30.3	10.4	30.2	10.6	30.1	10.8
33	31.5	09.8	31.4	10.0	31.4	10.2	31.4	10.4	31.3	10.6	31.2	10.7	31.2	10.9	31.1	11.1
34	32.5	10.1	32.4	10.3	32.3	10.5	32.3	10.7	32.2	10.9	32.2	11.1	32.1	11.3	32.0	11.5
35	33.4	10.4	33.4	10.6	33.3	10.8	33.3	11.0	33.2	11.2	33.1	11.4	33.0	11.6	33.0	11.8
36	34.4	10.7	34.3	10.9	34.2	11.1	34.2	11.3	34.1	11.5	34.1	11.7	34.0	11.9	33.9	12.1
37	35.3	11.9	35.3	11.2	35.2	11.4	35.2	11.6	35.1	11.8	35.0	12.0	34.9	12.2	34.9	12.5
38	36.3	11.2	36.2	11.5	36.1	11.7	36.1	11.9	26.0	12.2	35.9	12.4	35.9	12.6	35.8	12.8
39	37.2	11.5	37.2	11.8	37.1	12.0	37.1	12.2	37.0	12.5	36.9	12.7	36.8	12.9	36.7	13.1
40	38.2	11.8	38.1	12.1	38.0	12.3	38.0	12.6	37.9	12.8	37.8	13.0	37.8	13.2	37.7	13.5
41	39.2	12.1	39.1	12.4	39.0	12.6	39.0	12.9	38.9	13.1	38.8	13.3	38.7	13.6	38.6	13.8
42	40.1	12.4	40.0	12.7	39.9	12.9	39.9	13.2	39.8	13.4	39.7	13.7	39.6	13.9	39.6	14.2
43	41.1	12.7	41.0	13.0	40.9	13.2	40.9	13.5	40.8	13.8	40.7	14.0	40.6	14.2	40.5	14.5
44	42.0	13.9	41.9	13.3	41.8	13.5	41.8	13.8	41.7	14.1	41.6	14.3	41.5	14.6	41.4	14.8
45	43.0	13.3	42.9	13.6	42.8	13.8	42.8	14.1	42.7	14.4	42.6	14.6	42.5	14.9	42.4	15.2
46	43.9	13.6	43.8	13.9	43.7	14.2	43.7	14.4	43.6	14.7	43.5	15.0	43.4	15.2	43.3	15.5
47	44.9	13.9	[illegible]	14.2	44.7	14.5	44.7	14.8	44.6	15.0	44.5	15.3	44.4	15.6	44.3	15.8
48	45.8	13.1	45.7	14.5	45.6	14.8	45.6	15.1	45.5	15.4	45.4	15.6	45.3	15.9	45.2	16.2
49	46.8	14.4	46.7	14.8	46.5	15.1	46.6	15.4	46.5	15.7	46.4	15.9	46.3	16.2	46.2	16.5
50	47.8	14.8	47.7	15.1	47.6	15.4	47.5	15.7	47.4	16.0	49.3	16.3	47.2	16.6	47.1	16.9
Distanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	72d 46m		72d 25m		72d 04m		71d 43m		71d 22m		71d 01m		70d 40m		70d 19m	
	Qu. 322		Qu. 315		Qu. 308		Qu. 302		Qu. 296		Qu. 290		Qu. 285		Qu. 27	

Qu.31 —		Qu.31 +		Qu.32 +		Qu.33 +		Qu.34 —		Qu.34 +		Qu.35 +		Qu.3[illegible] —		Distance
17d 14m		17d 35m		17d 56m		18d 17m		18d 38m		18d 59m		19d 20m		19d 41m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
48.7	15.1	48.6	15.4	48.5	15.7	48.5	16.0	48.3	16.3	48.2	16.6	48.1	16.9	48.0	17.2	51
49.7	15.4	49.6	15.7	49.5	16.0	49.4	16.3	49.3	16.6	49.2	16.9	49.1	17.2	49.0	17.5	52
50.6	15.7	50.5	16.0	50.4	16.3	50.4	16.6	50.2	17.0	50.1	17.2	50.0	17.5	49.9	17.9	53
51.6	16.0	51.5	16.3	51.4	16.6	51.3	17.0	51.2	17.3	51.1	17.6	51.0	17.9	50.9	18.2	54
52.5	16.3	52.4	16.6	52.3	16.9	52.3	17.3	52.1	17.6	52.0	17.9	51.9	18.2	51.8	18.5	55
53.5	16.6	53.4	16.9	53.3	17.2	53.2	17.6	53.1	17.9	53.0	18.2	52.9	18.5	52.8	18.9	56
54.4	16.9	54.3	17.2	54.2	17.6	54.2	17.9	54.0	18.2	53.9	18.5	53.8	18.9	53.7	19.2	57
55.4	17.2	55.3	17.5	55.2	17.9	55.1	18.2	55.0	18.6	54.9	18.9	54.8	19.2	54.6	19.5	58
56.3	17.5	56.2	17.8	56.1	18.2	56.1	18.5	55.9	18.9	55.8	19.2	55.7	19.5	55.6	19.9	59
57.3	17.8	57.2	18.1	57.1	18.5	57.0	18.8	56.9	19.2	56.8	19.5	56.6	19.9	56.5	20.2	60
58.3	18.1	58.1	18.4	58.0	18.8	58.0	19.2	57.8	19.5	57.7	19.8	57.6	20.2	57.5	20.6	61
59.2	18.4	59.1	18.7	59.0	19.1	58.9	19.5	58.8	19.8	58.7	20.2	58.5	20.5	58.4	20.9	62
60.2	18.6	60.0	19.0	59.9	19.4	59.9	19.8	59.7	20.2	59.6	20.5	59.5	20.9	59.3	21.2	63
61.1	18.9	61.0	19.3	60.9	19.7	60.8	20.1	60.7	20.5	60.5	20.8	60.4	21.2	60.3	21.6	64
62.1	19.2	61.9	19.6	61.8	20.0	61.8	20.4	61.6	20.8	61.5	21.1	61.4	21.5	61.2	21.9	65
63.0	19.5	62.9	19.9	62.8	20.3	62.7	20.7	62.6	21.1	62.4	21.5	62.3	21.8	62.2	22.2	66
64.0	19.8	63.9	20.2	63.7	20.6	63.7	21.0	63.5	21.4	63.4	21.8	63.2	22.2	63.1	22.6	67
64.9	20.1	64.8	20.5	64.7	20.9	64.6	21.4	64.5	21.8	64.3	22.1	64.2	22.5	64.1	22.9	68
65.9	20.4	65.8	20.8	65.6	21.2	65.6	21.7	65.4	22.1	65.3	22.4	65.1	22.8	65.0	23.3	69
66.9	20.7	66.7	21.1	66.6	21.5	66.5	22.0	66.4	22.4	66.2	22.8	66.1	23.2	65.9	23.6	70
67.8	21.0	67.7	21.4	67.5	21.9	67.5	22.3	67.3	22.7	67.2	23.1	67.0	23.5	66.9	23.9	71
68.8	21.3	68.6	21.7	68.5	22.2	68.4	22.6	68.3	23.0	68.1	23.4	68.0	23.8	67.8	24.3	72
69.7	21.5	69.6	22.0	69.4	22.5	69.4	22.9	69.2	23.4	69.1	23.7	68.9	24.2	68.8	24.6	73
70.7	21.8	70.5	22.3	70.4	22.8	70.3	23.2	70.2	23.7	70.0	24.1	69.9	24.5	69.7	24.9	74
71.6	22.2	71.5	22.7	71.3	23.1	71.3	23.6	71.1	24.0	71.0	24.4	70.8	24.8	70.7	25.3	75
72.6	22.5	72.4	23.0	72.3	23.4	72.2	23.9	72.0	24.3	71.9	24.7	71.7	25.2	71.6	25.6	76
73.5	22.8	73.4	23.3	73.2	23.7	73.2	24.2	73.0	24.6	72.8	25.0	72.7	25.5	72.5	26.0	77
74.5	23.1	74.3	23.6	74.2	24.0	74.1	24.5	73.9	25.0	73.8	25.4	73.6	25.8	73.5	26.3	78
75.4	23.4	75.3	23.9	75.1	24.3	75.1	24.8	74.9	25.3	74.7	25.7	74.6	26.2	74.4	26.6	79
76.4	23.7	76.2	24.2	76.1	24.6	76.0	25.1	75.8	25.6	75.7	26.0	75.5	26.5	75.4	27.0	80
77.4	24.0	77.2	24.5	77.0	24.9	77.0	25.4	76.8	25.9	76.6	26.3	76.5	26.8	76.3	27.3	81
78.3	24.3	78.1	24.8	78.0	25.3	77.9	25.7	77.7	26.2	77.6	26.7	77.4	27.1	77.2	27.6	82
79.3	24.6	79.1	25.1	78.9	25.6	78.8	26.1	78.7	26.6	78.5	27.0	78.4	27.5	78.2	28.0	83
80.2	24.9	80.1	25.4	79.9	25.9	79.8	26.4	79.6	26.9	79.5	27.3	79.3	27.8	79.1	28.3	84
81.2	25.2	81.0	25.7	80.9	26.2	80.7	26.7	80.6	27.2	80.4	27.6	80.2	28.1	80.1	28.6	85
82.1	25.5	82.0	26.0	81.8	26.5	81.7	27.0	81.5	27.5	81.4	28.0	81.2	28.5	81.0	29.0	86
83.1	25.8	82.9	26.3	82.7	26.8	82.7	27.3	82.5	27.8	82.3	28.3	82.1	28.8	82.0	29.3	87
84.0	26.0	83.9	26.6	83.7	27.1	83.6	27.6	83.4	28.2	83.2	28.6	83.1	29.1	82.9	29.6	88
85.0	26.3	84.8	26.9	84.6	27.4	84.6	27.9	84.4	28.5	84.2	28.9	84.0	29.5	83.8	30.0	89
86.0	26.6	85.8	27.2	85.6	27.7	85.5	28.3	85.3	28.8	85.1	29.3	85.0	29.8	84.8	30.3	90
86.9	26.9	86.7	27.5	86.5	28.0	86.5	28.6	86.3	29.1	86.1	29.6	85.9	30.1	85.7	30.6	91
87.9	27.2	87.7	27.8	87.5	28.3	87.4	28.9	87.2	29.4	87.0	29.9	86.8	30.5	86.7	31.0	92
88.8	27.5	88.6	28.1	88.4	28.6	88.4	29.2	88.2	29.8	88.0	30.2	87.8	30.8	87.6	31.3	93
89.8	27.8	89.6	28.4	89.4	28.9	89.3	29.5	89.1	30.1	88.9	30.6	88.7	31.1	88.5	31.6	94
90.7	28.1	90.5	28.7	90.3	29.2	90.3	29.8	90.1	30.4	89.9	30.9	89.7	31.4	89.5	32.0	95
91.7	28.4	91.5	29.0	91.3	29.6	91.2	30.1	91.0	30.7	90.8	31.2	90.6	31.8	90.4	32.4	96
92.6	28.7	92.4	29.3	92.2	29.9	92.2	30.4	92.0	31.0	91.8	31.5	91.6	32.1	91.4	32.7	97
93.6	28.9	93.4	29.6	93.2	30.2	93.1	30.8	92.9	31.4	92.7	31.9	92.5	32.4	92.3	33.0	98
94.5	29.2	94.4	29.9	94.2	30.5	94.1	31.1	93.9	31.7	93.7	31.2	93.5	32.8	93.3	33.4	99
95.5	29.6	95.3	30.2	95.1	30.8	95.0	31.4	94.8	32.0	94.6	32.5	94.4	33.1	94.2	33.7	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
72d 46m		72d 25m		72d 04m		71d 43m		71d 22m		71d 01m		70d 40m		70d 19m		
Qu. 322		Qu. 315		Qu. 308		Qu. 302		Qu. 296		Qu. 290		Qu. 285		Qu. 279		

Distanc	Qu. 36 +		Qu. 37 +		Qu. 38 —		Qu. 38 +		Qu. 39 +		Qu. 40 —		Qu. 40 +		Qu. 41 +	
	20d 02m		20d 23m		20d 45m		21d 06m		21d 27m		21d 48m		22d 09m		22d 30m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	00.9	00.3	00.9	00.3	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4
2	01.9	00.7	01.9	00.7	01.9	00.7	01.9	00.7	01.9	00.7	01.9	00.7	01.9	00.8	01.8	00.8
3	02.8	01.0	02.8	01.0	02.8	01.1	02.8	01.1	02.8	01.1	02.8	01.1	02.8	01.1	02.8	01.1
4	03.8	01.4	03.7	01.4	03.7	01.4	03.7	01.4	03.7	01.5	03.7	01.5	03.7	01.5	03.7	01.5
5	04.7	01.7	04.7	01.7	04.7	01.8	04.7	01.8	04.7	01.8	04.6	01.9	04.6	01.9	04.6	01.9
6	05.6	02.1	05.6	02.1	05.6	02.1	05.6	02.2	05.6	02.2	05.6	02.2	05.6	02.3	05.5	02.3
7	06.6	02.4	06.6	02.4	06.5	02.5	06.5	02.5	06.5	02.6	06.5	02.6	06.5	02.6	06.5	02.7
8	07.5	02.7	07.5	02.8	07.5	02.8	07.5	02.9	07.4	02.9	07.4	03.0	07.4	03.0	07.4	03.1
9	08.5	03.1	08.4	03.1	08.4	03.2	08.4	03.2	08.4	03.3	08.4	03.3	08.3	03.4	08.3	03.4
10	09.4	03.4	09.4	03.5	09.4	03.5	09.3	03.6	09.3	03.7	09.3	03.7	09.3	03.8	09.2	03.8
11	10.3	03.8	10.3	03.8	10.3	03.9	10.3	04.0	10.2	04.0	10.2	04.1	10.2	04.1	10.2	04.2
12	11.3	04.1	11.2	04.2	11.2	04.3	11.2	04.3	11.2	04.4	11.1	04.5	11.1	04.5	11.1	04.6
13	12.2	04.5	12.2	04.5	12.2	04.6	12.1	04.7	12.1	04.8	12.1	04.8	12.0	04.9	12.0	05.0
14	13.2	04.8	13.1	04.9	13.1	05.0	13.1	05.0	13.0	05.1	13.0	05.2	13.0	05.3	12.9	05.4
15	14.1	05.1	14.1	05.2	14.0	05.3	14.0	05.4	14.0	05.5	13.9	05.6	13.9	05.7	13.9	05.7
16	15.0	05.5	15.0	05.6	15.0	05.7	14.9	05.8	14.9	05.9	14.8	05.9	14.8	06.0	14.8	06.1
17	16.0	05.8	15.9	05.9	15.9	06.0	15.9	06.1	15.8	06.2	15.8	06.3	15.7	06.4	15.7	06.5
18	16.9	06.2	16.9	06.3	16.8	06.4	16.8	06.5	16.8	06.6	16.7	06.7	16.7	06.8	16.6	06.9
19	17.9	06.5	17.8	06.6	17.8	06.7	17.7	06.8	17.7	07.0	17.6	07.0	17.6	07.2	17.6	07.3
20	18.8	06.9	18.7	07.0	18.7	07.1	18.7	07.2	18.6	07.3	18.6	07.4	18.5	07.5	18.5	07.7
21	19.7	07.2	19.7	07.3	19.6	07.4	19.6	07.6	19.6	07.7	19.5	07.8	19.4	07.9	19.4	08.0
22	20.7	07.5	20.6	07.7	20.6	07.8	20.5	07.9	20.5	08.1	20.4	08.2	20.4	08.3	20.3	08.4
23	21.6	07.9	21.6	08.0	21.5	08.1	21.5	08.3	21.4	08.4	21.3	08.5	21.3	08.7	21.3	08.8
24	22.6	08.2	22.5	08.4	22.4	08.5	22.4	08.6	22.3	08.8	22.3	08.9	22.2	09.0	22.2	09.2
25	23.5	08.6	23.4	08.7	23.4	08.9	23.3	09.0	23.3	09.2	23.2	09.3	23.2	09.4	23.3	09.6
26	24.4	08.9	24.4	09.0	24.3	9.2	24.3	09.4	24.2	09.5	24.1	09.6	24.1	09.8	24.0	10.0
27	25.4	09.3	25.3	09.4	25.2	09.6	25.2	09.7	25.1	09.9	25.1	10.0	25.0	10.2	24.9	10.3
28	26.3	09.6	26.2	09.7	26.2	09.9	26.1	09.9	26.1	10.2	26.0	10.4	25.9	10.6	25.9	10.7
29	27.3	09.9	27.2	10.1	27.1	10.3	27.1	10.4	27.0	10.6	26.9	10.8	26.9	10.9	26.8	11.1
30	28.2	10.3	28.1	10.4	28.1	10.6	28.0	10.8	27.9	11.0	27.8	11.1	27.8	11.3	27.7	11.5
31	29.1	10.6	29.0	10.8	29.0	11.0	28.9	11.2	28.9	11.3	28.8	11.5	28.7	11.7	28.6	11.9
32	30.1	11.0	30.0	11.1	29.9	11.3	29.9	11.5	29.8	11.7	29.7	11.9	29.6	12.1	29.6	12.3
33	31.0	11.3	30.9	11.5	30.9	11.7	30.8	11.9	30.7	12.1	30.6	12.2	30.6	12.4	30.5	12.6
34	32.0	11.7	31.9	11.8	31.8	12.0	31.7	12.2	31.6	12.4	31.6	12.6	31.5	12.8	31.4	13.0
35	32.9	12.0	32.8	12.2	32.7	12.4	32.7	12.6	32.6	12.8	32.5	13.0	32.4	13.2	32.3	13.4
36	33.8	12.3	33.7	12.5	33.7	12.7	33.6	13.0	33.5	13.2	33.4	13.4	33.3	13.6	33.3	13.8
37	34.8	12.7	34.7	12.9	34.6	13.1	34.5	13.3	34.4	13.5	34.3	13.7	34.3	13.9	34.2	14.2
38	35.7	13.0	35.6	13.2	35.5	13.5	35.5	13.5	35.4	13.9	35.3	14.1	35.2	14.3	35.1	14.6
39	36.7	13.4	36.5	13.6	36.5	13.8	36.4	14.0	36.3	14.3	36.2	14.5	36.1	14.7	36.0	14.9
40	37.6	13.7	37.5	13.9	37.4	14.2	37.3	14.4	37.2	14.6	37.1	14.8	37.0	15.1	37.0	15.3
41	38.5	14.1	38.4	14.3	38.3	14.5	38.3	14.8	38.2	15.0	38.0	15.2	38.0	15.5	37.9	15.7
42	39.5	14.4	39.4	14.4	39.3	14.9	39.2	15.1	39.1	15.4	39.0	15.6	38.9	15.8	38.8	16.1
43	40.4	14.7	40.3	15.0	40.2	15.2	40.1	15.5	40.0	15.7	39.9	16.0	39.8	16.2	39.7	16.5
44	41.3	15.1	41.2	15.3	41.1	15.6	41.1	15.8	41.0	16.1	40.8	16.3	40.7	16.6	40.6	16.9
45	42.3	15.4	42.2	15.7	42.1	15.9	42.0	16.2	41.9	16.5	41.8	16.7	41.7	17.0	41.6	17.2
46	43.2	15.8	43.1	16.0	43.0	16.3	42.9	16.6	42.8	16.8	42.7	17.1	42.6	17.3	42.5	17.6
47	44.2	16.1	44.0	16.4	43.9	16.6	43.9	16.9	43.8	17.2	43.6	17.4	43.5	17.7	43.4	18.0
48	45.1	16.5	45.0	16.7	44.9	17.0	44.8	17.3	44.7	17.6	44.5	17.8	44.4	18.1	44.3	18.4
49	46.1	16.8	45.9	17.1	45.8	17.3	45.7	17.6	45.6	17.9	45.5	18.2	45.4	18.5	45.2	18.8
50	47.0	17.2	46.9	17.4	46.8	17.7	46.7	18.0	46.6	18.3	46.4	18.6	46.3	18.9	46.2	19.2
Distance	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	69d 58m		69d 37m		69d 15m		68d 54m		68d 33m		68d 12m		67d 51m		67d 30m	
	Qu. 274		Qu. 269		Qu. 264		Qu. 259		Qu. 254		Qu. 25		Qu. 24		Qu. 241	

6 Pts.

The TRAVERSE TABLE.

Qu. 36 +		Qu. 37 +		Qu. 38 —		Qu. 38 +		Qu. 39 +		Qu. 40 —		Qu. 40 +		Qu. 41 +		Distance.
20d 02m		20d 23m		20d 45m		21d 06m		21d 27m		21d 48m		22d 09m		22d 30m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
47.9	17.5	47.8	17.7	47.7	18.1	47.6	18.4	47.5	18.7	47.3	18.9	47.2	19.2	47.1	19.5	51
48.9	17.8	48.7	18.1	48.6	18.4	48.5	18.7	48.4	19.0	48.3	19.2	48.2	19.6	48.0	19.9	52
49.8	18.2	49.7	18.4	49.6	18.8	49.4	19.1	49.3	19.4	49.2	19.7	49.1	20.0	49.0	20.3	53
50.8	18.5	50.6	18.8	50.5	19.1	50.4	19.4	50.3	19.8	50.1	20.0	50.0	20.4	49.9	20.7	54
51.7	18.9	51.5	19.1	51.4	19.5	51.3	19.8	51.2	20.1	51.0	20.4	50.9	20.7	50.8	21.0	55
52.6	19.2	52.5	19.5	52.4	19.8	52.2	20.2	52.2	20.5	52.0	20.8	51.9	21.1	51.7	21.4	56
53.6	19.6	53.4	19.8	53.3	20.2	53.2	20.5	53.1	20.9	52.9	21.1	52.8	21.5	52.7	21.8	57
54.5	19.9	54.3	20.2	54 2	20.5	54 1	20.7	54.0	21.2	53.8	21.5	53.7	21.9	53.6	22.2	58
55.5	20.2	55.3	20.5	55.2	20.9	55.0	21.2	54.9	21.6	54.8	21.9	54.6	22.2	54.5	22.6	59
56.4	20.6	56.2	20.9	56.1	21.2	56.0	21.6	55.9	22.0	55.7	22.3	55.6	22.6	55.4	23.0	60
57.3	20.9	57.2	21.2	57.0	21.6	56.9	22.0	56.8	22.3	56.6	22.6	56.5	23.0	56.3	23.3	61
58.3	21.3	58.1	21.6	58.0	21.9	57.8	22.3	57.7	22.7	57.5	23.0	57.4	23.4	57.3	23.7	62
59.2	21.6	59.0	21.9	58.9	22.3	58.8	22.7	58.7	23.1	58.5	23.4	58.3	23.8	58.2	24.1	63
60.2	22.0	60.0	22.3	59.8	22.7	59.7	23.0	59.6	23.4	59.4	23.7	59.3	24.1	59.1	24.5	64
61.1	22.3	60.9	22.6	60.8	23.0	60.6	23.4	60.5	23.8	60.3	24.1	60.2	24.5	60.0	24.9	65
62.0	22.6	61.8	23.0	61.7	23.4	61.6	23.8	61.4	24.2	61.2	24.5	61.1	24.9	61.0	25.3	66
63.0	23.0	62.8	23.1	62.6	23.7	62.5	24.1	62.4	24.5	62.2	24.9	62.0	25.3	61.9	25.6	67
63.9	23 3	63.7	23.7	63.6	24.1	63.4	24.3	63.3	24.9	63.1	25.2	63.0	25.6	62.8	26.0	68
64.9	23.7	64.7	24.0	64.5	24.4	64.4	24.8	64.2	25.3	64.0	25.6	63.9	26.0	63.7	26.4	69
65.8	24.0	65.6	24.4	65.5	24.8	65.3	25.2	65.2	25.6	65.0	26.0	64.8	25.4	64.7	26.8	70
66.7	24.4	66.5	24.7	66.4	25.1	66.2	25.6	66.1	26.0	65.9	26.3	65.7	26.8	65.6	27.2	71
67.7	24.7	67.5	25.1	67.3	25.5	67.2	25.9	67.0	26.4	66.8	26.7	66.7	27.1	66.5	27.6	72
68.6	25.0	68.4	25.4	68.3	25.8	68.1	26.3	68.0	26.7	67.8	27.0	67.6	27.5	67.4	27.9	73
69.6	25.4	69.3	25.8	69.2	26.2	69.0	26.6	68.9	27.1	68.7	27.5	68.5	27.9	68.3	28.3	74
70.5	25.7	70.3	26.1	70.1	26.6	70.0	27 0	69.8	27.5	69.6	27.8	69.5	28.3	69.3	28.7	75
71.4	26.1	71.2	26.4	71.1	26.9	70.9	27.4	70.8	27.8	70.5	28.2	70.4	28.7	70.2	29.1	76
72.4	26.4	72.2	26.8	72.0	27.3	71.8	27.7	71.7	28.2	71.5	28.6	71.3	29.0	71.1	29.5	77
73.3	26.8	73.1	27.1	72.9	27.6	72.8	27.9	72.6	28.5	72.4	28.9	72.2	29.4	72.0	29.8	78
74.3	27.1	74.0	27.5	73.9	28.0	73.7	28.4	73.6	28.9	73.3	29.3	73.2	29.8	73.0	30.2	79
75.2	27.4	75.0	27.8	74.8	28.3	74.6	28.8	74.5	29.3	74.2	29.7	74.1	30.2	73.9	30.6	80
76.1	28.8	75.9	28.2	75.7	28.7	75.6	29.2	75.4	29.6	75.2	30.1	75.0	30.5	74.8	31.0	81
77.1	28.1	76.8	28.5	76.7	29.0	76.5	29.5	76.3	30.0	76.1	30.4	75.9	30.9	75.7	31.4	82
78.0	28.5	77.8	28.9	77.6	29.4	77.4	29.9	77.3	30.4	77.0	30.8	76.9	31 3	76.7	31.8	83
79.0	28.8	78.7	29.2	78.5	29.7	78.4	30.2	78.2	30.7	78.0	31.2	77.8	31.7	77.6	32.1	84
79.9	29.2	79.6	29.6	79.5	30.1	79.3	30.6	79.2	31.1	78.9	31.5	78.7	32.0	78.5	32.5	85
80.8	29.5	80.6	29.9	80.4	30.4	80.2	31.0	80.1	31.5	79.8	31.9	79.6	32.4	79.4	32.9	86
81.8	29.8	81.5	30.3	81.3	30.8	81.2	31.3	81.0	31.8	80.7	32.3	80.6	32.8	80.4	33.3	87
82.7	30.2	82.5	30.6	82.3	31.2	82.1	31.5	81.9	32.2	81.7	32.6	81.5	33.2	81.3	33.7	88
83.7	30.5	83.4	31.0	83.2	31.5	83.0	32.0	82.9	32.6	82.6	33.0	82.4	33.6	82.2	34.1	89
84.6	30.9	84.3	31.3	84.2	31.9	84 0	32.4	83.8	32.9	83.5	33.4	83.3	33.9	83.2	34.5	90
85.5	31.2	85.3	31.7	85.1	32.2	84.9	32.8	84.7	33.3	84.4	33.8	84.3	34.3	84.1	34.8	91
86.5	31.6	86.2	31.8	86.0	32.6	85.8	33.1	85.7	33.7	85.4	34.1	85.2	34.7	85.0	35.2	92
87.4	31.9	87.1	32.4	87.0	32.9	86.8	33.5	86.6	34.0	86.3	34.5	86.1	35.1	85.9	35.6	93
88.4	32.2	88.1	32.7	87.9	33.3	87.7	33.8	87.5	34.4	87.2	34.9	87.0	35.4	86.8	36.0	94
89.3	32.6	89.0	33.1	88.8	33.6	88.6	34.2	88.4	34.8	88.2	35.2	88.0	35.8	87.8	36.3	95
90.2	32.9	90.0	32.4	89.8	34.0	89.6	34.6	89.4	35.1	89.1	35.6	88.9	36 2	88.7	36.7	96
91.2	33.3	90 9	33.8	90.7	34.3	90.5	34.9	90.3	35.5	90.0	36.0	89.8	36.6	89.6	37.1	97
92.1	33.6	91.8	34 1	91.6	34.7	91.4	35.1	91.2	35.9	90.9	36.4	90.7	36.9	90.5	37.5	98
93.1	34.0	92.8	34.5	92 6	35.0	92.4	35.6	92.1	36.2	91.9	36.7	91.7	37.3	91.5	37.9	99
94.0	34.3	93.7	34.8	93.5	35.4	93.3	36.0	93.1	36.6	92.8	37.1	92.6	37.7	92.4	38.3	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
69d 58m		69d 37m		69d 15m		68d 54m		68d 33m		68d 12m		67d 51m		67d 30m		
Qu. 274		Qu. 269		Qu. 264		Qu. 259		Qu. 254		Qu. 250		Qu. 245		Qu. 241		

6 Pts.

Distanc	Qu. 42+		Qu. 43—		Qu. 43+		Qu. 44+		Qu. 45+		Qu. 46—		Qu. 46+		Qu. 47+	
	22d 51m		23d 12m		23d 33m		23d 54m		24d 15m		24d 37m		24d 58m		25d 19m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.4
2	01.8	00.8	01.8	00.8	01.8	00.8	01.8	00.8	01.8	00.3	01.8	00.8	01.8	00.8	01.8	00.9
3	02.8	01.2	02.8	01.2	02.8	01.2	02.7	01.2	02.7	01.2	02.7	01.2	02.7	01.3	02.7	01.3
4	03.7	01.6	03.7	01.6	03.7	01.6	03.7	01.6	03.6	01.6	03.6	01.7	03.6	01.7	03.6	01.7
5	04.6	01.9	04.6	02.0	04.6	02.0	04.6	02.0	04.6	02.1	04.5	02.1	04.5	02.1	04.5	02.1
6	05.5	02.3	05.5	02.4	05.5	02.4	05.5	02.4	05.5	02.5	05.4	02.5	05.4	02.5	05.4	02.6
7	06.5	02.7	06.4	02.8	06.4	02.8	06.4	02.8	06.4	02.9	06.4	02.9	06.3	03.0	06.3	03.0
8	07.4	03.1	07.4	03.2	07.3	03.2	07.3	03.2	07.3	03.3	07.3	03.3	07.2	03.4	07.2	03.4
9	08.3	03.5	08.3	03.5	08.3	03.6	08.2	03.6	08.2	03.7	08.2	03.7	08.2	03.8	08.1	03.9
10	09.2	03.9	09.2	03.9	09.2	04.0	09.1	04.1	09.1	04.1	09.1	04.2	09.1	04.2	09.0	04.3
11	10.1	04.3	10.1	04.3	10.1	04.4	10.1	04.5	10.0	04.5	10.0	04.6	10.0	04.6	09.9	04.7
12	11.1	04.7	11.0	04.7	11.0	04.8	11.0	04.9	10.9	04.9	10.9	05.0	10.9	05.1	10.8	05.1
13	12.0	05.0	11.9	05.2	11.9	05.2	11.9	05.3	11.9	05.3	11.8	05.4	11.8	05.5	11.8	05.6
14	12.9	05.4	12.9	05.5	12.8	05.6	12.8	05.7	12.8	05.8	12.7	05.8	12.7	05.9	12.7	06.0
15	13.8	05.8	13.8	05.9	13.8	06.0	13.7	06.1	13.7	06.2	13.6	06.2	13.6	06.3	13.6	06.4
16	14.8	06.2	14.7	06.3	14.7	06.4	14.6	06.5	14.6	06.6	14.5	06.7	14.5	06.8	14.5	06.8
17	15.7	06.6	15.6	06.7	15.6	05.8	15.5	06.9	15.5	07.0	15.4	07.1	15.4	07.2	15.4	07.3
18	16.6	07.0	16.5	07.1	16.5	07.2	16.5	07.3	16.4	07.4	16.4	07.5	16.3	07.6	16.3	07.7
19	17.5	07.4	17.5	07.5	17.4	07.6	17.4	07.7	17.3	07.8	17.3	07.9	17.2	08.0	17.2	08.1
20	18.4	07.8	18.4	07.9	18.3	08.0	18.3	08.1	18.2	08.2	18.2	08.3	18.1	08.4	18.1	08.6
21	19.4	08.1	19.3	08.3	19.3	08.4	19.2	08.5	19.2	08.6	19.1	08.7	19.0	08.9	19.0	09.0
22	20.3	08.5	20.2	08.7	20.2	08.8	20.1	08.9	20.1	09.0	20.0	09.2	19.9	09.3	19.9	09.4
23	21.2	08.9	21.1	09.1	21.1	09.2	21.0	09.3	21.0	09.5	20.9	09.6	20.8	09.7	20.8	09.8
24	22.1	09.3	22.1	09.5	22.0	09.6	21.9	09.7	21.9	09.9	21.8	10.0	21.7	10.1	21.7	10.3
25	23.1	09.7	23.0	09.9	22.9	10.0	22.9	10.1	22.8	10.3	22.7	10.4	22.7	10.6	22.6	10.7
26	24.0	10.1	23.9	10.2	23.8	10.4	23.8	10.5	23.7	10.7	23.6	10.8	23.6	11.0	23.5	11.1
27	24.9	10.5	24.8	10.6	24.8	10.8	24.7	10.9	24.6	11.1	24.5	11.2	24.5	11.4	24.4	11.5
28	25.8	10.9	25.7	11.0	25.7	11.2	25.6	11.3	25.5	11.5	25.5	11.6	25.4	11.8	25.3	12.0
29	26.7	11.3	26.7	11.4	26.6	11.6	26.5	11.7	26.4	11.9	26.4	12.1	26.3	12.2	26.2	12.4
30	27.7	11.6	27.6	11.8	27.5	12.0	27.4	12.2	27.4	12.3	27.3	12.5	27.2	12.7	27.1	12.8
31	28.6	12.0	28.5	12.2	28.4	12.4	28.3	12.6	28.3	12.7	28.2	12.9	28.1	13.1	28.0	13.3
32	29.5	12.4	29.4	12.6	29.3	12.8	29.2	13.0	29.2	13.2	29.1	13.3	29.0	13.5	28.9	13.7
33	30.4	12.8	30.3	13.0	30.3	13.2	30.2	13.4	30.1	13.6	30.0	13.7	29.9	13.9	29.8	14.1
34	31.3	13.2	31.2	13.4	31.2	13.6	31.1	13.8	31.0	14.0	30.9	14.1	30.8	14.3	30.7	14.5
35	32.3	13.6	32.2	13.8	32.1	14.0	32.0	14.2	31.9	14.4	31.8	14.6	31.7	14.8	31.6	15.0
36	33.2	14.0	33.1	14.2	33.0	14.4	32.9	14.6	32.8	14.8	32.7	15.0	32.6	15.2	32.5	15.4
37	34.1	14.4	34.0	14.6	33.9	14.8	33.8	15.0	33.7	15.2	33.6	15.4	33.5	15.6	33.4	15.8
38	35.0	14.7	34.9	15.0	34.8	15.2	34.7	15.4	34.7	15.6	34.5	15.8	34.4	16.0	34.3	16.2
39	36.0	15.1	35.9	15.4	35.8	15.6	35.6	15.8	35.6	16.0	35.5	16.2	35.3	16.5	35.3	16.7
40	36.9	15.5	36.8	15.8	36.7	16.0	36.6	16.2	36.5	16.4	36.4	16.6	36.2	16.9	36.2	17.1
41	37.8	15.9	37.7	16.2	37.6	16.4	37.5	16.6	37.4	16.9	37.3	17.1	37.1	17.3	37.1	17.5
42	38.7	16.3	38.6	16.5	38.5	16.8	38.4	17.0	38.3	17.3	38.2	17.5	38.1	17.7	38.0	18.0
43	39.6	16.7	39.5	16.9	39.4	17.2	39.3	17.4	39.2	17.7	39.1	17.9	39.0	18.1	38.9	18.4
44	40.6	17.1	40.4	17.3	40.3	17.6	40.2	17.8	40.1	18.1	40.0	18.3	39.9	18.6	39.8	18.8
45	41.5	17.5	41.4	17.7	41.3	18.0	41.1	18.2	41.0	18.2	40.9	18.7	40.8	19.0	40.7	19.2
46	42.4	17.8	42.3	18.1	42.2	18.4	42.0	18.6	42.0	18.9	41.8	19.1	41.7	19.4	41.6	19.7
47	43.3	18.2	43.2	18.5	43.1	18.8	43.0	19.0	42.9	19.3	42.7	19.6	42.6	19.8	42.5	20.1
48	44.3	18.6	44.1	18.9	44.0	19.2	43.9	19.4	43.8	19.7	43.6	20.0	43.5	20.3	43.4	20.5
49	45.2	19.0	45.0	19.3	44.9	19.6	44.8	19.8	44.7	20.1	44.5	20.4	44.4	20.7	44.3	20.9
50	46.1	19.4	46.0	19.7	45.9	20.0	45.7	20.3	45.6	20.6	45.5	20.8	45.3	21.1	45.2	21.4
Distance	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	67d 09m		66d 48m		56d 27m		66d 06m		65d 45m		65d 23m		65d 02m		64d 41m	
	Qu. 237		Qu. 233		Qu. 229		Qu. 225		Qu. 221		Qu. 218		Qu. 214		Qu. 211	

5¾ Pts.

The TRAVERSE TABLE.

2¼ Point

Qu. 42 +		Qu. 43 —		Qu. 43 +		Qu. 44 +		Qu. 45 +		Qu 45 —		Qu. 46 +		Qu. 47 +		Distance.
22d 54m		23d 12m		23d 33m		23d 54m		24d 15m		24d 37m		24d 58m		25d 19m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
47.0	19.8	46.9	20.1	46.8	20.4	46.6	20.7	46.5	21.0	46.4	21.2	46.2	21.5	46.1	21.8	51
47.9	20.2	47.8	20.5	47.7	20.8	47.5	21.1	47.4	21.4	47.3	21.6	47.1	21.9	46.9	22.2	52
48.9	20.6	48.7	20.9	48.6	21.2	48.4	21.5	48.3	21.8	48.2	22.0	48.0	22.4	47.9	22.7	53
49.8	21.0	49.6	21.3	49.5	21.6	49.4	21.9	49.2	22.2	49.1	22.5	48.9	22.8	48.8	23.1	54
50.7	21.3	50.5	21.7	50.4	22.0	50.3	22.3	50.2	22.6	50.0	22.9	49.8	23.2	49.7	23.5	55
51.6	21.7	51.5	22.1	51.4	22.4	51.2	22.7	51.1	23.0	50.9	23.3	50.7	23.6	50.6	23.9	56
52.6	22.1	52.4	22.5	52.3	22.8	52.1	23.1	52.0	23.4	51.8	23.7	51.6	24.1	51.5	24.4	57
53.5	22.5	53.3	22.9	53.2	23.2	53.0	23.5	52.9	23.8	52.7	24.1	52.5	24.5	52.4	24.8	58
54.4	22.9	54.2	23.2	54.1	23.6	53.9	23.9	53.8	24.2	53.6	24.5	53.5	24.9	53.3	25.2	59
55.3	23.3	55.1	23.6	55.0	24.0	54.8	24.3	54.7	24.7	54.5	25.0	54.4	25.3	54.2	25.7	60
56.2	23.7	56.1	24.0	55.9	24.4	55.8	24.7	55.6	25.1	55.4	25.4	55.3	25.7	55.1	26.1	61
57.2	24.1	57.0	24.4	56.9	24.8	56.7	25.1	56.5	25.5	56.4	25.8	56.2	26.2	56.0	26.5	62
58.1	24.4	57.9	24.8	57.8	25.2	57.6	25.5	57.5	25.9	57.3	26.2	57.1	26.6	56.9	26.9	63
59.0	24.8	58.8	25.2	58.7	25.6	58.5	25.9	58.4	26.3	58.2	26.6	58.0	27.0	57.9	27.4	64
59.9	25.2	59.7	25.6	59.6	26.0	59.4	26.3	59.3	26.7	59.1	27.0	58.9	27.4	58.8	27.8	65
60.9	25.6	60.7	26.0	60.5	26.4	60.3	26.7	60.2	27.1	60.0	27.5	59.8	27.9	59.7	28.2	66
61.8	26.0	61.6	26.4	61.4	26.8	61.2	27.1	61.1	27.5	60.9	27.9	60.7	28.3	60.6	28.6	67
62.7	26.4	62.5	26.8	62.4	27.2	62.2	27.5	62.0	27.9	61.8	28.3	61.[illegible]	28.7	61.5	29.1	68
63.6	26.8	63.4	27.2	63.3	27.6	63.1	27.9	62.9	28.4	62.7	28.7	62.5	29.1	62.4	29.5	69
64.5	27.2	64.3	27.6	64.2	28.0	64.0	28.4	63.8	28.8	63.6	29.1	63.4	29.5	63.3	30.0	70
65.5	27.5	65.3	28.0	65.1	28.4	64.9	28.8	64.8	29.2	64.5	29.5	64.3	30.0	64.2	30.4	71
66.4	27.9	66.2	28.4	66.0	28.8	65.8	29.2	65.7	29.6	65.4	30.0	65.2	30.4	65.1	30.8	72
67.3	28.3	67.1	28.8	66.9	29.2	66.7	29.6	66.6	30.0	66.4	30.4	66.1	30.8	66.0	31.2	73
68.2	28.7	68.0	29.2	67.9	29.6	67.6	30.0	67.5	30.4	67.3	30.8	67.0	31.2	66.9	31.6	74
69.2	29.1	68.9	29.6	68.8	30.0	68.6	30.4	68.4	30.8	68.2	31.2	68.0	31.7	67.8	32.1	75
70.1	29.5	69.8	29.9	69.7	30.4	69.5	30.8	69.3	31.2	69.1	31.6	68.9	32.1	68.7	32.5	76
71.0	29.9	70.8	30.3	70.6	30.8	70.4	31.2	70.2	31.6	70.0	32.0	69.8	32.5	69.6	32.9	77
71.9	30.3	71.7	30.7	71.5	31.2	71.3	31.6	71.1	32.1	70.9	32.4	70.7	32.9	70.5	33.3	78
72.8	30.7	72.6	31.1	72.4	31.6	72.2	32.0	72.0	32.5	71.8	32.9	71.6	33.3	71.4	33.8	79
73.8	31.0	73.5	31.5	73.4	32.0	73.1	32.4	73.0	32.9	72.7	33.3	72.5	33.8	72.3	34.2	80
74.7	31.4	74.4	31.9	74.3	32.4	74.0	32.8	73.9	33.3	73.6	33.7	73.4	34.2	73.2	34.6	81
75.6	31.8	75.4	32.3	75.2	32.8	74.9	33.2	74.8	33.7	74.5	34.1	74.3	34.6	74.1	35.1	82
76.5	32.2	76.3	32.7	76.1	33.2	75.9	33.6	75.7	34.1	75.5	34.5	75.2	35.0	75.0	35.5	83
77.4	32.6	77.2	33.1	77.0	33.6	76.8	34.0	76.6	34.5	76.4	34.9	76.1	35.4	75.9	35.9	4
78.4	33.0	78.1	33.5	77.9	34.0	77.7	34.4	77.5	34.9	77.3	35.4	77.0	35.9	76.8	36.8	85
79.3	33.4	79.0	33.9	78.9	34.4	78.6	34.8	78.4	35.3	78.2	35.8	77.9	36.3	77.7	36.8	86
80.2	33.8	80.0	34.3	79.8	34.8	79.5	35.2	79.3	35.8	79.1	36.2	78.8	36.7	78.6	37.2	87
81.1	34.1	81.9	34.7	80.7	35.2	80.4	35.6	80.3	36.2	80.0	36.6	79.7	37.1	79.5	37.6	88
82.1	34.5	81.8	35.1	81.6	35.6	81.3	36.0	81.2	36.5	80.9	37.0	80.6	37.6	80.5	38.1	89
83.0	34.9	82.7	35.5	82.5	36.0	82.3	36.5	82.1	37.0	81.8	37.4	81.5	38.0	81.4	38.5	90
83.9	35.3	83.6	35.9	83.4	36.4	83.2	36.9	81.0	37.4	82.7	37.9	82.4	38.4	82.3	38.9	91
84.8	35.7	84.6	36.2	84.4	36.8	84.1	37.3	83.9	37.8	83.6	38.3	83.4	38.8	83.2	39.3	92
85.7	36.1	85.5	36.6	85.3	37.2	85.0	37.7	84.8	38.7	84.5	38.7	84.3	39.2	84.1	39.8	93
86.7	36.5	86.4	37.0	86.2	37.6	85.9	38.0	85.7	38.6	85.5	39.1	85.2	39.7	85.0	40.2	94
87.6	36.9	87.3	37.4	87.1	38.0	86.8	38.5	86.6	39.0	86.4	39.5	86.1	40.1	85.9	40.6	95
88.5	37.2	88.2	37.8	88.0	38.4	87.7	38.9	87.6	39.5	87.3	39.9	87.0	40.5	86.8	41.0	96
89.4	37.6	89.1	38.2	89.0	38.8	88.7	39.3	88.5	37.9	88.2	40.4	87.9	40.9	87.7	41.5	97
90.4	38.0	90.1	38.6	89.9	39.2	89.6	39.7	89.4	40.3	89.1	40.8	88.8	41.4	88.6	41.9	98
91.3	38.4	91.0	39.0	90.8	39.6	90.5	40.1	90.3	40.7	90.0	41.2	89.7	41.8	89.5	42.3	99
92.2	38.8	91.9	39.4	91.7	40.0	91.4	40.5	91.2	41.1	90.9	41.6	90.6	42.2	90.4	42.8	0
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
67d 09m		66d 48m		66d 27m		66d 06m		65d 45m		65d 23m		55d 02m		64d 41m		
Qu. 237		Qu. 233		Qu. 229		Qu. 225		Qu. 22		Qu. 216		Qu. 214		Qu. 211		

5¾ Pts

2½ Pt.

Distanc	Qu.48+		Qu.49—		Qu.49+		Qu.50+		Qu.51+		Qu.52—		Qu.52+		Qu.53+	
	25d 40m		26d 01m		26d 22m		26d 43m		27d 04m		27d 25m		27d 46m		28d 07m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	00.9	00.4	00.9	00.4	00.9	00.4	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5
2	01.8	00.9	01.8	00.9	01.8	00.9	01.8	00.9	01.8	00.9	01.8	00.9	01.8	00.9	01.8	00.9
3	02.7	01.3	02.7	01.3	02.7	01.3	02.7	01.4	02.7	01.4	02.7	01.4	02.7	01.4	02.6	01.4
4	03.6	01.7	03.6	01.8	03.6	01.8	03.6	01.8	03.6	01.8	03.6	01.8	03.5	01.9	03.5	01.9
5	04.5	02.2	04.5	02.2	04.5	02.2	04.5	02.3	04.5	02.3	04.4	02.3	04.4	02.3	04.4	02.4
6	05.4	02.6	05.4	02.6	05.4	02.7	05.4	02.7	05.3	02.7	05.3	02.8	05.3	02.8	05.3	02.8
7	06.3	03.0	06.3	03.1	06.3	03.1	06.3	03.2	06.2	03.2	06.2	03.2	06.2	03.3	06.2	03.3
8	07.2	03.5	07.2	03.5	07.2	03.6	07.1	03.6	07.1	03.6	07.1	03.7	07.1	03.7	07.1	03.8
9	08.1	03.9	08.1	04.0	08.1	04.0	08.0	04.1	08.0	04.1	08.0	04.1	08.0	04.2	07.9	04.8
10	09.0	04.3	09.0	04.4	09.0	04.4	08.9	04.5	08.9	04.6	08.9	04.6	08.9	04.7	08.8	04.7
11	09.9	04.8	09.9	04.8	09.9	04.9	09.8	05.0	09.8	05.0	09.8	05.1	09.7	05.1	09.7	05.2
12	10.8	05.2	10.8	05.3	10.8	05.3	10.7	05.4	10.7	05.5	10.7	05.5	10.6	05.6	10.6	05.6
13	11.7	05.6	11.7	05.7	11.6	05.8	11.6	05.9	11.6	05.9	11.5	06.0	11.5	06.1	11.5	06.1
14	12.6	06.1	12.6	06.1	12.5	06.2	12.5	06.3	12.5	06.4	12.4	06.4	12.4	06.5	12.3	06.6
15	13.5	06.5	13.5	06.6	13.4	06.7	13.4	06.8	13.4	06.8	13.3	06.9	13.3	07.0	13.2	07.1
16	14.4	06.9	14.4	07.0	14.3	07.1	14.3	07.2	14.2	07.3	14.2	07.4	14.2	07.5	14.1	07.5
17	15.3	07.4	15.3	07.5	15.2	07.5	15.2	07.7	15.1	07.7	15.1	07.8	15.0	07.9	15.0	08.0
18	16.2	07.8	16.2	07.9	16.1	08.0	16.1	08.1	16.0	08.2	16.0	08.3	15.9	08.4	15.9	08.5
19	17.1	08.2	17.1	08.3	17.0	08.4	17.0	08.6	16.9	08.6	16.9	08.7	16.8	08.9	16.8	08.9
20	18.0	08.7	18.0	08.8	17.9	08.9	17.9	09.0	17.8	09.1	17.8	09.2	17.7	09.3	17.6	09.4
21	18.9	09.1	18.9	09.2	18.8	09.3	18.8	09.5	18.7	09.6	18.6	09.7	18.6	09.8	18.5	09.9
22	19.8	09.5	19.8	9.7	19.7	09.8	19.6	09.9	19.6	10.0	19.5	10.1	19.5	10.3	19.4	10.3
23	20.7	10.0	20.7	10.1	20.6	10.2	20.5	10.4	20.5	10.5	20.4	10.6	20.4	10.7	20.3	10.8
24	21.6	10.4	21.6	10.5	21.5	10.7	21.4	10.8	21.4	10.9	21.3	11.0	21.2	11.2	21.2	11.3
25	22.5	10.8	22.5	11.0	22.4	11.1	22.3	10.3	22.3	11.4	22.2	11.5	22.1	11.7	22.0	11.8
26	23.4	11.3	23.4	11.4	23.3	11.5	23.2	11.7	23.1	11.8	23.1	12.0	23.0	12.1	22.9	12.3
27	24.3	11.7	24.3	11.9	24.2	12.0	24.1	12.2	24.0	12.3	24.0	12.4	23.9	12.6	23.8	12.7
28	25.2	12.1	25.2	12.3	25.1	12.4	25.0	12.6	24.9	12.7	24.9	12.9	24.8	13.0	24.7	13.2
29	26.1	12.6	26.1	12.7	26.0	12.8	25.9	13.1	25.8	13.2	25.8	13.3	25.7	13.5	25.6	13.7
30	27.0	13.0	27.0	13.2	26.9	13.3	26.8	13.5	26.7	13.7	26.6	13.8	26.6	14.0	26.5	14.1
31	27.9	13.4	27.9	13.6	27.8	13.8	27.7	14.0	27.6	14.1	27.5	14.3	27.4	14.4	27.3	14.6
32	28.8	13.9	28.8	14.0	28.7	14.2	28.6	14.4	28.5	14.6	28.4	14.7	28.3	14.9	28.2	15.1
33	29.7	14.3	29.7	14.5	29.6	14.7	29.5	14.9	29.4	15.0	29.3	15.2	29.2	15.4	29.1	15.5
34	30.6	14.7	30.6	14.9	30.5	15.1	30.4	15.3	30.3	15.5	30.2	15.6	30.1	15.8	30.0	16.0
35	31.5	15.2	31.5	15.4	31.4	15.5	31.3	15.8	31.2	15.9	31.1	16.1	31.0	16.3	30.9	16.5
36	32.4	15.6	32.4	15.8	32.3	16.0	32.1	16.2	32.0	16.4	32.0	16.6	31.9	16.8	31.7	17.0
37	33.3	16.0	33.3	16.2	33.2	16.4	33.0	16.7	32.9	16.8	32.9	17.0	32.7	17.2	32.6	17.4
38	34.2	16.5	34.2	16.7	34.0	16.9	33.9	17.1	33.9	17.3	33.7	17.5	33.6	17.7	33.5	17.9
39	35.1	16.9	35.1	17.1	34.9	17.3	34.8	17.6	34.7	17.7	34.6	17.9	34.5	18.2	34.4	18.4
40	36.0	17.3	36.0	17.6	35.8	17.8	35.7	18.0	35.6	18.2	35.5	18.4	35.4	18.6	35.3	18.9
41	36.9	17.8	36.9	18.0	36.7	18.2	36.6	18.5	36.5	18.7	36.4	18.9	36.3	19.1	36.1	19.3
42	37.8	18.2	37.8	18.4	37.6	18.6	37.5	18.9	37.4	19.1	37.3	19.3	37.2	19.6	37.0	19.8
43	38.7	18.6	38.7	18.9	38.5	19.1	38.4	19.4	38.3	19.6	38.2	19.8	38.1	20.0	37.9	20.3
44	39.6	19.1	39.6	19.3	39.4	19.5	39.3	19.8	39.2	20.0	39.1	20.2	38.9	20.5	38.8	20.8
45	40.5	19.5	40.5	19.8	40.3	20.0	40.2	20.3	40.1	20.5	40.0	20.7	39.8	21.0	39.7	21.2
46	41.4	19.9	41.4	20.2	41.2	20.4	41.1	20.7	40.9	20.9	40.8	21.2	40.7	21.4	40.6	21.7
47	42.3	20.4	42.3	20.6	42.1	20.9	42.0	21.2	41.8	21.4	41.7	21.6	41.6	21.9	41.4	22.2
48	43.2	20.8	43.2	21.1	43.0	21.3	42.9	21.6	42.7	21.8	42.6	22.1	42.5	22.4	42.3	22.6
49	44.1	21.2	44.1	21.5	43.9	21.8	43.8	22.1	43.6	22.3	43.5	22.5	43.4	22.8	43.2	23.2
50	45.1	21.7	45.0	22.0	44.8	22.2	44.7	22.5	44.5	22.8	44.4	23.0	44.3	23.3	44.1	23.6
Distan	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	64d 20m		63d 59m		63d 38m		63d 17m		62d 56m		62d 35m		62d 14m		61d 53m	
	Q1 208		Qu. 204		Qu. 201		Qu. 198		Qu. 195		Qu 193		Qu. 190		Qu. 187	

5½ Pts.

The Traverse Table.

2½ Point

Qu.48+		Qu.49—		Qu.49+		Qu.50+		Qu.51+		Qu.52—		Qu.52+		Qu.53+		Distance.
25d 40m		26d 01m		26d 22m		26d 43m		27d 04m		27d 25m		27d 46m		28d 07m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
46.0	22.1	45.8	22.4	45.7	22.6	45.5	23.0	45.4	23.2	45.3	23.5	45.1	23.8	45.0	24.0	51
46.9	22.5	46.7	22.8	46.6	23.1	46.4	23.4	46.3	23.7	46.2	23.9	46.0	24.2	45.9	24.5	52
47.8	22.9	47.6	23.3	47.5	23.5	47.3	23.9	47.2	24.1	47.1	24.4	46.9	24.7	46.7	25.0	53
48.7	23.4	48.5	23.7	48.4	23.9	48.2	24.3	48.1	24.6	48.0	24.8	47.8	25.2	47.6	25.5	54
49.6	23.8	49.4	24.1	49.3	24.4	49.1	24.8	49.0	25.0	48.8	25.3	48.7	25.6	48.5	25.9	55
50.5	24.2	50.3	24.6	50.2	24.9	50.0	25.2	49.8	25.5	49.7	25.8	49.6	26.1	49.4	26.4	56
51.4	24.7	51.2	25.0	51.1	25.3	50.9	25.7	50.7	25.9	50.6	26.2	50.4	25.6	50.3	26.9	57
52.3	25.1	52.1	25.5	52.0	25.8	51.8	26.1	51.6	26.4	51.5	26.7	51.3	27.0	51.2	27.3	58
53.2	25.5	53.0	25.9	52.9	26.2	52.7	26.6	52.5	26.8	52.4	27.1	52.2	27.5	52.0	27.8	59
54.1	26.0	53.9	26.3	53.8	26.6	53.6	27.0	53.4	27.3	53.3	27.6	53.1	28.0	52.9	28.3	60
55.0	26.4	54.8	26.8	54.7	27.1	54.5	27.5	54.3	27.8	54.2	28.1	54.0	28.4	53.8	28.7	61
55.9	26.8	55.7	27.2	55.6	27.5	55.4	27.9	55.2	28.2	55.1	28.5	54.9	28.9	54.7	29.2	62
56.8	27.3	56.6	27.7	56.4	28.0	56.3	28.4	56.1	28.7	55.9	29.0	55.8	29.4	55.6	29.7	63
57.7	27.7	57.5	28.1	57.3	28.4	57.2	28.8	57.0	29.1	56.8	29.4	56.6	29.8	56.4	30.2	64
58.6	28.1	58.4	28.5	58.2	28.9	58.0	29.3	57.9	29.6	57.7	29.9	57.5	30.3	57.3	30.5	65
59.5	28.6	59.3	29.0	59.1	29.3	58.9	29.7	58.7	30.0	58.6	30.4	58.4	30.8	58.2	31.1	66
60.4	29.0	60.2	29.4	60.0	29.7	59.8	30.2	59.6	30.5	59.5	30.8	59.3	31.2	59.1	31.6	67
61.3	29.4	61.1	29.9	60.9	30.2	60.7	30.6	60.5	30.9	60.4	31.3	60.2	31.7	60.0	32.0	68
62.2	29.9	62.0	30.3	61.8	30.6	61.6	31.1	61.4	31.4	61.3	31.7	61.1	32.2	60.8	32.5	69
63.1	30.3	62.9	30.7	62.7	31.1	62.5	31.5	62.3	31.9	62.2	32.2	62.0	32.6	61.7	33.0	70
64.0	30.7	63.8	31.2	63.6	31.5	63.4	32.0	63.2	32.3	63.0	32.7	62.8	33.1	62.6	33.5	71
64.9	31.2	64.7	31.6	64.5	32.0	64.3	32.4	64.1	32.8	63.9	33.1	63.7	33.6	63.5	33.9	72
65.8	31.6	65.6	32.0	65.4	32.4	65.2	32.9	65.0	33.2	64.8	33.6	64.6	34.0	64.4	34.4	73
66.7	32.0	66.5	32.5	66.3	32.9	66.1	33.3	65.9	33.7	65.7	34.0	65.5	34.5	65.3	34.9	74
67.6	32.5	67.4	32.9	67.2	33.3	67.0	33.8	66.8	34.1	66.6	34.5	66.4	35.0	66.1	35.4	75
68.5	32.9	68.3	33.4	68.1	33.7	67.9	34.2	67.6	34.6	67.5	35.0	67.3	35.4	67.0	35.8	76
69.4	33.3	69.2	33.8	69.0	34.2	68.8	34.7	68.5	35.0	68.4	35.4	68.1	35.9	67.9	36.3	77
70.3	33.8	70.1	34.2	69.9	34.6	69.7	35.1	69.4	35.5	69.3	35.9	69.0	36.3	68.8	36.8	78
71.2	34.2	71.0	34.7	70.8	35.0	70.5	35.6	70.3	35.9	70.2	36.3	69.9	36.8	69.7	37.2	79
72.1	34.6	71.9	35.1	71.7	35.5	71.4	36.0	71.2	36.4	71.0	36.8	70.8	37.3	70.5	37.7	80
73.0	35.1	72.8	35.6	72.6	36.0	72.3	36.5	72.1	36.9	71.9	37.3	71.7	37.7	71.4	38.2	81
73.9	35.5	73.7	36.0	73.5	36.4	73.2	36.9	73.0	37.3	72.8	37.7	72.6	38.2	72.3	38.6	82
74.8	35.9	74.6	36.4	74.4	36.9	74.1	37.4	73.9	37.8	73.7	38.2	73.5	38.7	73.2	39.1	83
75.7	36.4	75.5	36.9	75.3	37.3	75.0	37.8	74.8	38.2	74.6	38.6	74.3	39.1	74.1	39.6	84
76.6	36.8	76.4	37.3	76.2	37.7	75.9	38.3	75.7	38.7	75.5	39.1	75.2	39.6	75.0	40.1	85
77.5	37.2	77.3	37.8	77.1	38.2	76.8	38.7	76.5	39.1	76.4	39.6	76.1	40.1	75.8	40.5	86
78.4	37.7	78.2	38.2	78.0	38.6	77.7	39.2	77.4	39.6	77.3	40.0	77.0	40.5	76.7	41.0	87
79.3	38.1	79.1	38.6	78.8	39.1	78.6	39.6	78.3	40.0	78.1	40.5	77.9	41.0	77.6	41.5	88
80.2	38.5	80.0	39.1	79.7	39.5	79.5	40.1	79.2	40.5	79.0	40.9	78.8	41.5	78.5	41.9	89
81.1	39.9	80.9	39.5	80.6	40.0	80.4	40.5	80.1	41.0	79.9	41.4	79.7	41.9	79.4	42.4	90
82.0	39.4	81.8	39.9	81.5	40.4	81.3	41.0	81.0	41.4	80.8	41.9	80.5	42.4	80.2	42.9	91
82.9	39.8	82.7	40.4	82.4	40.8	82.2	41.4	81.9	41.9	81.7	42.3	81.4	42.9	81.1	43.3	92
83.8	[illegible]	83.6	40.8	83.3	41.3	83.0	41.9	82.8	42.3	82.6	42.8	82.3	43.3	82.0	43.8	93
84.7	40.7	84.5	41.3	84.2	41.7	83.9	42.3	83.7	42.8	83.5	43.2	83.2	43.8	82.9	44.3	94
85.6	41.1	85.4	41.7	85.1	42.2	84.8	42.8	84.6	43.3	84.4	43.7	84.1	44.3	83.8	44.8	95
86.5	41.6	86.3	42.1	86.0	42.6	85.7	43.2	85.4	43.7	85.2	44.2	85.0	44.7	84.7	45.2	96
87.4	42.0	87.2	42.6	86.9	43.1	86.6	43.7	86.3	44.1	86.1	44.6	85.8	45.2	85.6	45.7	97
88.3	42.4	88.1	43.0	87.8	43.5	87.5	44.1	87.2	44.6	87.0	45.1	86.7	45.7	86.4	46.2	98
89.2	42.9	89.0	43.5	88.7	44.0	88.4	44.6	88.1	45.0	87.9	45.5	87.6	46.1	87.3	46.7	99
90.1	43.3	89.9	43.9	89.6	44.4	89.3	45.0	89.0	45.5	88.8	46.0	88.5	46.6	88.2	47.1	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance.
64d 20m		63d 59m		63d 38m		63d 17m		62d 56m		62d 35m		62d 14m		61d 53m		
Qu. 208		Qu. 204		Qu. 201		Qu. 198		Qu. 195		Qu. 193		Qu. 190		Qu. 187		

E

5½ Pts.

Diſtanc	Qu 54 +		Qu. 55 +		Qu. 56 —		Qu. 56 +		Qu. 57 +		Qu. 58 +		Qu. 59 +		Qu. 60 —	
	28d 29m		28d 50m		29d 11m		29d 32m		29d 53m		30d 14m		30d 35m		30d 56m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5	00.9	00.5
2	01.8	01.0	01.8	01.0	01.7	01.0	01.7	01.0	01.7	01.0	01.7	01.0	01.7	01.0	01.7	01.0
3	02.6	01.4	02.6	01.4	02.6	01.5	02.6	01.5	02.6	01.5	02.6	01.5	02.6	01.5	02.6	01.5
4	03.5	01.9	03.5	01.9	03.5	02.0	03.5	02.0	03.5	02.0	03.5	02.0	03.4	02.0	03.4	02.1
5	04.4	02.4	04.4	02.4	04.4	02.4	04.4	02.5	04.3	02.5	04.3	02.5	04.3	02.5	04.3	02.6
6	05.3	02.9	05.3	02.9	05.2	02.9	05.2	03.0	05.2	03.0	05.2	03.0	05.2	03.1	05.1	03.1
7	06.2	03.3	06.1	03.4	06.1	03.4	06.1	03.5	06.1	03.5	06.0	03.5	06.0	03.6	06.0	03.6
8	07.0	03.8	07.0	03.9	07.0	03.9	07.0	03.9	06.9	04.0	06.9	04.0	06.9	04.1	06.9	04.1
9	07.9	04.3	07.9	04.3	07.9	04.4	07.8	04.4	07.8	04.5	07.8	04.5	07.7	04.6	07.7	04.6
10	08.8	04.8	08.8	04.8	08.7	04.9	08.7	04.9	08.7	05.0	08.6	05.0	08.6	05.1	08.6	05.1
11	09.7	05.2	09.6	05.3	09.6	05.4	09.6	05.4	09.5	05.5	09.5	05.5	09.5	05.6	09.4	05.6
12	10.5	05.7	10.5	05.8	10.5	05.9	10.4	05.9	10.4	06.0	10.4	06.0	10.3	06.1	10.3	06.2
13	11.4	06.2	11.4	06.3	11.3	06.3	11.3	06.4	11.3	06.5	11.2	06.6	11.2	06.6	11.1	06.7
14	12.3	06.7	12.3	06.7	12.2	06.8	12.2	06.9	12.1	07.0	12.1	07.1	12.1	07.1	12.0	07.2
15	13.2	07.2	13.1	07.2	13.1	07.3	13.1	07.4	13.0	07.5	13.0	07.6	12.9	07.6	12.9	07.7
16	14.1	07.6	14.0	07.7	14.0	07.8	13.9	07.9	13.9	08.0	13.8	08.1	13.8	08.1	13.7	08.2
17	14.9	08.1	14.9	08.2	14.8	08.3	14.8	08.4	14.7	08.5	14.7	08.6	14.6	08.7	14.6	08.7
18	15.8	08.6	15.8	08.7	15.7	08.8	15.7	08.9	15.6	09.0	15.6	09.1	15.5	09.2	15.4	09.2
19	16.7	09.1	16.6	09.2	16.6	09.3	16.5	09.4	16.5	09.5	16.4	09.6	16.4	09.7	16.3	09.8
20	17.6	09.5	17.5	09.6	17.5	09.8	17.4	09.9	17.3	10.0	17.3	10.1	17.2	10.2	17.1	10.3
21	18.5	10.0	18.4	10.1	18.3	10.2	18.3	10.4	18.2	10.5	18.1	10.6	18.1	10.7	18.0	10.8
22	19.3	10.5	19.3	10.6	19.2	10.7	19.1	10.8	19.1	11.0	19.0	11.1	18.9	11.2	18.9	11.3
23	20.2	11.0	20.1	11.1	20.1	11.2	20.0	11.3	19.9	11.5	19.9	11.6	19.8	11.7	19.7	11.8
24	21.1	11.4	21.0	11.6	21.0	11.7	20.9	11.8	20.8	12.0	20.7	12.1	20.7	12.2	20.6	12.3
25	22.0	11.9	21.9	12.1	21.8	12.2	21.8	12.3	21.7	12.5	21.6	12.6	21.5	12.7	21.4	12.8
26	22.9	12.4	22.8	12.5	22.7	12.7	22.6	12.8	22.5	12.9	22.5	13.1	22.4	13.2	22.3	13.4
27	23.7	12.9	23.7	13.0	23.6	13.2	23.5	13.	23.4	13.4	23.3	13.6	23.2	13.7	23.1	13.9
28	24.6	13.4	24.5	13.5	24.4	13.7	24.4	13.8	24.3	13.9	24.2	14.1	24.1	14.3	24.0	14.4
29	25.5	13.8	25.4	14.0	25.3	14.2	25.2	14.3	25.1	14.4	25.1	14.6	25.0	14.8	24.9	14.9
30	26.4	14.3	26.3	14.5	26.2	14.6	26.1	14.8	26.0	14.9	25.9	15.1	25.8	15.3	25.7	15.4
31	27.2	14.8	27.2	14.9	27.1	15.1	27.0	15.3	26.9	15.4	26.8	15.6	26.7	15.8	26.6	15.9
32	28.1	15.3	28.0	15.4	27.9	15.6	27.8	15.8	27.7	15.9	27.6	16.1	27.5	16.3	27.4	16.4
33	29.0	15.7	28.9	15.9	28.8	16.1	28.7	16.3	28.6	16.4	28.5	16.6	28.4	16.8	28.3	17.0
34	29.9	16.2	29.8	16.4	29.7	16.6	29.6	16.8	29.5	16.9	29.4	17.1	29.3	17.3	29.2	17.5
35	30.8	16.7	30.7	16.9	30.6	17.1	30.5	17.3	30.3	17.4	30.2	17.6	30.1	17.8	30.0	18.0
36	31.6	17.2	31.5	17.4	31.4	17.6	31.3	17.7	31.2	17.9	31.1	18.1	31.0	18.3	30.9	18.5
37	32.5	17.6	32.4	17.8	32.3	18.1	32.2	18.2	32.1	18.4	32.0	18.6	31.9	18.8	31.7	19.0
38	33.4	18.1	33.3	18.3	33.1	18.5	33.1	18.7	32.9	18.9	32.8	19.2	32.7	19.3	32.5	19.5
39	34.3	18.6	34.2	18.8	34.0	19.0	33.9	19.2	33.8	19.4	33.7	19.7	33.6	19.8	33.4	20.0
40	35.2	19.1	35.0	19.3	34.9	19.5	34.8	19.7	34.7	19.9	34.6	20.2	34.4	20.4	34.3	20.6
41	36.0	19.6	35.9	19.8	35.8	20.0	35.7	20.2	35.5	20.4	35.4	20.7	35.3	20.9	35.2	21.1
42	36.9	20.0	36.8	20.2	36.7	20.5	36.5	20.7	36.4	20.9	36.3	21.2	36.2	21.4	36.0	21.6
43	37.8	20.5	37.7	20.7	37.5	21.0	37.4	21.2	37.3	21.4	37.2	21.7	37.0	21.9	36.9	22.1
44	38.7	21.0	38.5	21.2	38.4	21.5	38.3	21.7	38.1	21.9	38.0	22.2	37.9	22.4	37.7	22.6
45	39.6	21.5	39.4	21.7	39.3	22.0	39.2	22.2	39.0	22.4	38.9	22.7	38.7	22.9	38.6	23.1
46	40.4	21.9	40.3	22.2	40.2	22.4	40.0	22.7	39.9	22.9	39.7	23.2	39.6	23.4	39.5	23.6
47	41.3	22.4	41.2	22.7	41.0	22.9	40.9	23.2	40.7	23.4	40.6	23.7	40.5	23.9	40.3	24.2
48	42.2	22.9	42.0	23.1	41.9	23.4	41.8	23.7	41.6	23.9	41.5	24.2	41.3	24.4	41.2	24.7
49	43.1	23.4	42.9	23.6	42.8	23.9	42.6	24.2	42.5	24.4	42.3	24.7	42.2	24.9	42.0	25.2
50	44.0	23.9	43.8	24.1	43.7	24.4	43.5	24.7	43.4	24.9	43.2	25.2	43.1	25.4	42.9	25.7
Diſtanc	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	61d 31m		61d 10m		60d 49m		60d 28m		60d 07m		59d 46m		59d 25m		59d 04m	
	Qu. 184		Qu. 181		Qu. 178		Qu. 176		Qu. 174		Qu. 171		Qu. 169		Qu. 166	

5¼ Pts.

Qu. 54 +		Qu. 55 +		Qu. 56 −		Qu. 56 +		Qu. 57 +		Qu. 58 +		Qu. 59 +		Qu. 60 −		Distance.
28d 29m		28d 50m		29d 11m		29d 32m		29d 53m		30d 14m		30d 35m		30d 56m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
44.8	24.3	44.7	24.6	44.5	24.9	44.4	25.1	44.2	25.4	44.1	25.7	43.9	26.0	43.7	26.2	51
45.7	24.8	45.6	25.1	45.4	25.4	45.2	25.6	45.1	25.9	44.9	26.2	44.8	25.5	44.6	26.7	52
46.6	25.3	46.4	25.5	46.3	25.9	46.1	26.1	46.0	26.4	45.8	25.7	45.6	27.0	45.5	27.2	53
47.5	25.8	47.3	26.0	47.1	26.4	47.0	26.6	46.8	26.9	46.7	27.2	46.5	27.5	46.3	27.8	54
48.3	26.2	48.2	26.5	48.0	26.8	47.9	27.1	47.7	27.4	47.5	27.7	47.4	28.0	47.2	28.3	55
49.2	26.7	49.1	27.0	48.9	27.3	48.7	27.6	48.6	27.9	48.4	28.2	48.2	28.5	48.0	28.8	56
50.1	27.2	49.9	27.5	49.8	27.8	49.6	28.1	49.4	28.4	49.2	28.7	49.1	29.0	48.9	29.3	57
51.0	27.7	50.8	28.0	50.6	28.3	50.5	28.6	50.3	28.9	50.1	29.2	49.9	29.5	49.7	29.8	58
51.9	28.1	51.7	28.4	51.5	28.8	51.3	29.1	51.2	29.4	51.0	29.7	50.8	30.0	50.6	30.3	59
52.7	28.6	52.6	28.9	52.4	29.3	52.2	29.6	52.0	29.9	51.8	30.2	51.7	30.5	51.5	30.8	60
53.6	29.1	53.4	29.4	53.2	29.8	53.1	30.1	52.9	30.4	52.7	30.7	52.5	31.1	52.3	31.4	61
54.5	29.6	54.3	29.9	54.1	30.3	53.9	30.6	53.8	30.9	53.6	31.2	53.4	31.6	53.2	31.9	62
55.4	30.1	55.2	30.4	55.0	30.7	54.8	31.1	54.6	31.4	54.4	31.8	54.2	32.1	54.0	32.4	63
56.3	30.5	56.1	30.8	55.9	31.2	55.7	31.6	55.5	31.9	55.3	32.3	55.1	32.6	54.9	32.9	64
57.1	31.0	56.9	31.3	56.7	31.7	56.6	32.0	56.4	32.4	56.2	32.8	56.0	33.1	55.7	33.4	65
58.0	31.5	57.8	31.8	57.6	32.2	57.4	32.5	57.2	32.9	57.0	33.3	56.8	33.6	56.6	33.9	66
58.9	32.0	58.7	32.3	58.5	32.7	58.3	33.0	58.1	33.4	57.9	33.8	57.7	34.1	57.5	34.4	67
59.8	32.4	59.6	32.8	59.4	33.2	59.2	33.5	59.0	33.9	58.8	34.3	58.5	34.6	58.3	34.9	68
60.7	32.9	60.4	33.3	60.2	33.7	60.0	34.0	59.8	34.4	59.6	34.8	59.4	35.1	59.2	35.5	69
61.5	33.4	61.3	33.7	61.1	34.2	60.9	34.5	60.7	34.9	60.5	35.3	60.3	35.6	60.0	36.0	70
62.4	33.9	62.2	34.2	62.0	34.6	61.8	35.0	61.6	35.4	61.3	35.8	61.1	36.1	60.9	36.5	71
63.3	34.3	63.1	34.7	62.9	35.1	62.6	35.5	62.4	35.9	62.2	36.3	62.0	36.7	61.8	37.0	72
64.2	34.8	63.9	35.2	63.7	35.6	63.5	36.0	63.3	36.4	63.1	36.8	62.9	37.2	62.6	37.5	73
65.0	35.3	64.8	35.7	64.6	36.1	64.4	36.5	64.2	36.9	63.9	37.3	63.7	37.7	63.5	38.0	74
65.9	35.8	65.7	36.2	65.5	36.8	65.3	37.0	65.0	37.4	64.8	37.8	64.6	38.2	64.3	38.6	75
66.8	36.3	66.6	36.6	66.3	37.1	66.1	37.5	65.9	37.8	65.7	38.3	65.4	38.7	65.2	39.1	76
67.7	36.7	67.5	37.1	67.2	37.6	67.0	38.0	66.8	38.3	66.5	38.8	66.3	39.2	66.0	39.6	77
68.6	37.2	68.3	37.6	68.1	38.1	67.9	38.5	67.6	38.8	67.4	39.3	67.2	39.7	66.9	40.1	78
69.4	37.7	69.2	38.1	69.0	38.6	68.7	38.9	68.5	39.3	68.3	39.8	68.0	40.2	67.8	40.6	79
70.3	38.2	70.1	38.6	69.8	39.0	69.6	39.4	69.4	39.8	69.1	40.3	68.9	40.7	68.6	41.1	80
71.2	38.6	71.0	39.0	70.7	39.5	70.5	39.9	70.2	40.3	70.0	40.8	69.7	41.2	69.5	41.6	81
72.1	39.1	71.8	39.5	71.6	40.0	71.3	40.4	71.1	40.8	70.8	41.3	70.6	41.7	70.3	42.2	82
73.0	39.6	72.7	40.0	72.5	40.5	72.2	40.9	72.0	41.3	71.7	41.8	71.5	42.3	71.2	42.7	83
73.8	40.1	73.6	40.5	73.3	41.0	73.1	41.4	72.8	41.8	72.6	42.3	72.3	42.8	72.1	43.2	84
74.7	40.5	74.5	41.0	74.2	41.5	74.0	41.9	73.7	42.3	73.4	42.8	73.2	43.3	72.9	43.7	85
75.6	41.0	75.3	41.5	75.1	42.0	74.8	42.4	74.6	42.8	74.3	43.3	74.0	43.8	73.8	44.2	86
76.5	41.5	76.2	41.9	76.0	42.5	75.7	42.9	75.4	43.3	75.2	43.8	74.9	44.3	74.6	44.7	87
77.4	42.9	77.1	42.4	76.8	42.9	76.6	43.4	75.3	43.8	76.0	44.4	75.8	44.8	75.5	45.2	88
78.2	42.5	78.0	42.9	77.7	43.4	77.4	43.9	77.2	44.3	76.9	44.9	76.6	45.3	76.3	45.8	89
79.1	42.9	78.8	43.4	78.6	43.9	78.3	44.4	78.0	44.8	77.8	45.4	77.5	45.8	77.2	46.3	90
80.0	43.4	79.7	43.9	79.4	44.4	79.2	44.9	78.9	45.3	78.6	45.9	78.4	46.3	78.1	46.8	91
80.9	43.9	80.6	44.3	80.3	44.9	80.0	45.4	79.8	45.8	79.5	46.4	79.2	46.8	78.9	47.3	92
81.7	44.4	81.5	44.8	81.2	45.4	80.9	45.9	80.6	46.3	80.4	45.9	80.1	47.3	79.8	47.8	93
82.6	44.8	82.3	45.3	82.1	45.9	81.8	46.3	81.5	46.8	81.2	47.4	80.9	47.9	80.6	48.3	94
83.5	45.3	83.2	45.8	82.9	46.4	82.7	46.8	82.4	47.3	82.1	47.9	81.8	48.4	81.5	48.8	95
84.4	45.8	84.1	46.3	83.8	46.8	83.5	47.3	83.2	47.8	82.9	48.4	82.7	48.9	82.3	49.3	96
85.3	46.3	85.0	46.8	84.7	47.3	84.4	47.8	84.1	48.3	83.8	48.9	83.5	49.4	83.2	49.9	97
86.1	46.7	85.8	47.2	85.6	47.8	85.3	48.3	85.0	48.8	84.7	49.4	84.4	49.9	84.1	50.4	98
87.0	47.2	86.7	47.7	86.4	48.3	86.1	48.8	85.8	49.3	85.5	49.9	85.2	50.4	84.9	50.9	99
87.9	47.7	87.6	48.2	87.3	48.8	87.0	49.3	86.7	49.8	86.4	50.4	86.1	50.9	85.8	51.4	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance
61d 31m		61d 10m		60d 49m		60d 28m		60d 07m		59d 46m		59d 25m		59d 04m		
Qu. 184		Qu. 181		Qu. 178		Qu. 176		Qu. 174		Qu. 171		Qu. 169		Qu. 166		

5¼ Pts.

Distanc	Qu 61 −		Qu.61 +		Qu.62 +		Qu.63 +		Qu 64 +		Qu.65 +		Qu.66 −		Qu.66 +	
	31d 17m		31d 38m		32d 00m		32d 21m		32d 42m		33d 03m		33d 24m		33d 45m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	00.9	00.5	00.9	00.5	00.8	00.5	00.8	00.5	00.8	00.5	00.8	00.5	00.8	00.6	00.8	00.6
2	01.7	01.0	01.7	01.0	01.7	01.1	01.7	01.1	01.7	01.1	01.7	01.1	01.7	01.1	01.7	01.1
3	02.6	01.6	02.6	01.6	02.5	01.6	02.5	01.6	02.5	01.6	02.5	01.6	02.5	01.7	02.5	01.7
4	03.4	02.1	03.4	02.1	03.4	02.1	03.4	02.1	03.4	02.2	03.4	02.2	03.3	02.2	03.3	02.2
5	04.3	02.6	04.3	02.6	04.2	02.6	04.2	02.7	04.2	02.7	04.2	02.7	04.2	02.8	04.2	02.8
6	05.1	03.1	05.1	03.1	05.1	03.2	05.1	03.2	05.1	03.2	05.0	03.3	05.0	03.3	05.0	03.3
7	06.0	03.6	06.0	03.7	05.9	03.7	05.9	03.7	05.9	03.8	05.9	03.8	05.8	03.9	05.8	03.9
8	06.8	04.2	06.8	04.2	06.8	04.2	06.8	04.3	06.7	04.3	06.7	04.4	06.7	04.4	06.6	04.4
9	07.7	04.7	07.7	04.7	07.6	04.8	07.6	04.8	07.6	04.9	07.5	04.9	07.5	05.0	07.5	05.0
10	08.6	05.2	08.5	05.2	08.5	05.3	08.5	05.4	08.4	05.4	08.4	05.5	08.4	05.5	08.3	05.6
11	09.4	05.7	09.4	05.8	09.3	05.9	09.3	05.9	09.3	05.9	09.2	06.0	09.2	06.1	09.1	06.1
12	10.3	06.2	10.2	06.3	10.2	06.4	10.1	06.4	10.1	06.5	10.1	06.5	10.0	06.6	10.0	06.7
13	11.1	06.7	11.1	06.8	11.0	06.9	11.0	07.0	10.9	07.0	10.9	07.1	10.9	07.2	10.8	07.2
14	12.0	07.3	11.9	07.3	11.9	07.4	11.8	07.5	11.8	07.6	11.7	07.6	11.7	07.7	11.6	07.8
15	12.8	07.8	12.8	07.9	12.7	07.9	12.7	08.0	12.6	08.1	12.6	08.2	12.5	08.3	12.5	08.3
16	13.7	08.3	13.6	08.4	13.6	08.5	13.5	08.6	13.5	08.6	13.4	08.7	13.4	08.8	13.3	08.9
17	14.5	08.8	14.5	08.9	14.4	09.0	14.4	09.1	14.3	09.2	14.2	09.3	14.2	09.4	14.1	09.4
18	15.4	09.3	15.3	09.4	15.3	09.5	15.2	09.6	15.2	09.7	15.1	09.8	15.0	09.9	15.0	10.0
19	16.2	09.9	16.2	10.0	16.1	10.1	16.1	10.2	16.0	10.3	15.9	10.4	15.9	10.5	15.8	10.6
20	17.1	10.4	17.0	10.5	17.0	10.6	16.9	10.7	16.8	10.8	16.8	10.9	16.7	11.0	16.6	11.1
21	18.0	10.9	17.9	11.0	17.8	11.1	17.7	11.2	17.7	11.3	17.6	11.4	17.5	11.6	17.5	11.7
22	18.8	11.4	18.7	11.5	18.6	11.7	18.6	11.8	18.5	11.9	18.4	12.0	18.4	12.1	18.3	12.2
23	19.7	11.9	19.6	12.1	19.5	12.2	19.4	12.3	19.4	12.4	19.3	12.5	19.2	12.7	19.1	12.8
24	20.5	12.5	20.4	12.6	20.3	12.7	20.3	12.8	20.2	13.0	20.1	13.1	20.0	13.2	20.0	13.3
25	21.4	13.0	21.3	13.1	21.2	13.2	21.1	13.4	21.1	13.5	21.0	13.6	20.9	13.8	20.8	13.9
26	22.2	13.5	22.2	13.6	22.0	13.8	22.0	13.9	21.9	14.0	21.8	14.2	21.7	14.3	21.6	14.4
27	23.1	14.0	23.0	14.1	22.9	14.3	22.8	14.4	22.7	14.6	22.6	14.7	22.5	14.9	22.4	15.0
28	23.9	14.5	23.9	14.7	23.7	14.8	23.7	15.0	23.6	15.1	23.5	15.3	23.4	15.4	23.3	15.5
29	24.8	15.1	24.7	15.2	24.6	15.4	24.5	15.5	24.4	15.7	24.3	15.8	24.2	16.0	24.1	16.1
30	25.7	15.6	25.6	15.7	25.4	15.9	25.4	16.1	25.3	16.2	25.1	16.4	25.1	16.5	24.9	16.7
31	26.5	16.1	26.4	16.2	26.3	16.4	26.2	16.6	26.1	16.7	26.0	16.9	25.9	17.1	25.8	17.2
32	27.4	16.6	27.3	16.8	27.1	17.0	27.0	17.1	26.9	17.3	26.8	17.4	26.7	17.6	26.6	17.8
33	28.2	17.1	28.1	17.3	28.0	17.5	27.9	17.7	27.8	17.8	27.7	18.0	27.6	18.2	27.4	18.3
34	29.1	17.6	29.0	17.8	28.8	18.0	28.7	18.2	28.6	18.4	28.5	18.5	28.4	18.7	28.3	18.9
35	29.9	18.2	29.8	18.3	29.7	18.5	29.6	18.7	29.5	18.9	29.3	19.1	29.2	19.3	29.1	19.4
36	30.8	18.7	30.7	18.9	30.5	19.1	30.4	19.3	30.3	19.4	30.2	19.6	30.1	19.8	29.9	20.0
37	31.6	19.2	31.5	19.4	31.4	19.6	31.3	19.8	31.2	20.0	31.0	20.2	30.9	20.4	30.8	20.6
38	32.5	19.7	32.4	19.9	32.2	20.1	32.1	20.3	32.0	20.5	31.8	20.7	31.7	20.9	31.6	21.1
39	33.3	20.2	33.2	20.4	33.1	20.7	33.0	20.9	32.8	21.1	32.7	21.3	32.6	21.5	32.4	21.7
40	34.2	20.8	34.1	21.0	33.9	21.2	33.8	21.4	33.7	21.6	33.5	21.8	33.4	22.0	33.3	22.2
41	35.1	21.3	34.9	21.5	34.8	21.7	34.6	21.9	34.5	22.1	34.4	22.3	34.2	22.6	34.1	22.8
42	35.9	21.8	35.8	22.0	35.6	22.3	35.5	22.5	35.4	22.7	35.2	22.9	35.1	23.1	34.9	23.3
43	36.8	22.3	36.6	22.5	36.5	22.8	36.3	23.0	36.2	23.2	36.0	23.4	35.9	23.7	35.7	23.9
44	37.6	22.8	37.5	23.1	37.3	23.3	37.2	23.5	37.0	23.8	36.9	24.0	36.7	24.2	36.6	24.4
45	38.5	23.4	38.3	23.6	38.1	23.8	38.0	24.1	37.9	24.3	37.7	24.5	37.6	24.8	37.4	25.0
46	39.3	23.9	39.2	24.1	39.0	24.4	38.9	24.6	38.7	24.8	38.5	25.1	38.4	25.3	38.2	25.5
47	40.2	24.4	40.0	24.6	39.9	24.9	39.7	25.1	39.6	25.4	39.4	25.6	39.2	25.9	39.1	26.1
48	41.0	24.9	40.9	25.2	40.7	25.4	40.6	25.7	40.4	25.9	40.2	26.2	40.1	26.4	39.9	26.7
49	41.9	25.4	41.7	25.7	41.5	26.0	41.4	26.2	41.3	26.5	41.1	26.7	40.9	27.0	40.7	27.2
50	42.8	26.0	42.6	26.2	42.4	26.5	42.3	26.8	42.1	27.0	41.9	27.3	41.8	27.5	41.6	27.8
Distanc	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	58d 43m		58d 22m		58d 00m		57d 39m		57d 18m		56d 57m		56d 36m		56d 15m	
	Qu. 164		Qu. 162		Qu. 158		Qu. 157		Qu. 155		Qu. 153		Qu. 151		Qu. 149	

Qu.61—		Qu.61+		Qu.62+		Qu 63+		Qu.64+		Qu.65+		Qu.66—		Qu.60+		Distance.
31d 17m		31d 38m		32d 00m		32d 21m		32d 42m		33d 03m		33d 24m		33d 45m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
43.6	26.5	43.5	26.7	43.2	27.0	43.1	27.3	42.9	27.5	42.7	27.8	42.6	28.1	42.4	28.3	51
44.5	27.0	44.3	27.2	44.1	27.6	43.9	27.8	43.8	28.1	43.6	28.3	43.4	28.6	43.2	28.9	52
45.3	27.5	45.2	27.8	44.9	28.1	44.8	28.4	44.6	28.6	44.4	28.9	44.3	29.2	44.1	29.4	53
46.2	28.0	46.0	28.3	45.8	28.6	45.6	28.9	45.5	29.2	45.3	29.4	45.1	29.7	44.9	30.0	54
47.0	28.5	46.9	28.8	46.6	29.1	46.5	29.4	46.3	29.7	46.1	30.0	45.9	30.3	45.7	30.6	55
47.9	29.1	47.7	29.3	47.5	29.7	47.3	30.0	47.2	30.2	46.9	30.5	46.8	30.8	46.6	31.1	56
48.7	29.6	48.6	29.9	48.3	30.2	48.2	30.5	48.0	30.8	47.8	31.1	47.6	31.4	47.4	31.7	57
49.6	30.1	49.4	30.4	49.2	30.7	49.0	31.0	48.8	31.3	48.6	31.6	48.4	31.9	48.2	32.2	58
50.4	30.6	50.3	30.9	50.0	31.3	49.9	31.6	49.7	31.9	49.4	32.2	49.3	32.5	49.0	32.8	59
51.3	31.1	51.1	31.4	50.9	31.8	50.7	32.1	50.5	32.4	50.3	32.7	50.1	33.0	49.9	33.3	60
52.2	31.7	52.0	32.0	51.7	32.3	51.5	32.6	51.4	32.9	51.1	33.2	50.9	33.6	50.7	33.9	61
53.0	32.2	52.8	32.5	52.6	32.9	52.4	33.2	52.2	33.5	52.0	33.8	51.8	34.1	51.5	34.4	62
53.9	32.7	53.7	33.0	53.4	33.4	53.2	33.7	53.0	34.0	52.8	34.3	52.6	34.7	52.4	35.0	63
54.7	33.2	54.5	33.5	54.3	33.9	54.1	34.2	53.9	34.6	53.6	34.9	53.4	35.2	53.2	35.5	64
55.6	33.7	55.4	34.1	55.1	34.4	54.9	34.8	54.7	35.1	54.5	35.4	54.3	35.8	54.0	36.1	65
56.4	34.3	56.2	34.6	56.0	35.0	55.8	35.3	55.6	35.6	55.3	36.0	55.1	36.3	54.9	36.7	66
57.3	34.8	57.1	35.1	56.8	35.5	56.6	35.8	56.4	36.2	56.1	36.5	55.9	36.9	55.7	37.2	67
58.1	35.3	57.9	35.6	57.7	36.0	57.5	36.4	57.3	36.7	57.0	37.1	56.8	37.4	56.5	37.8	68
59.0	35.8	58.8	36.2	58.5	36.6	58.3	36.9	58.1	37.3	57.8	37.6	57.6	38.0	57.4	38.3	69
59.9	36.3	59.6	36.7	59.4	37.1	59.2	37.5	58.9	37.8	58.7	38.2	58.5	38.5	58.2	38.9	70
60.7	36.9	60.5	37.2	60.2	37.6	60.0	38.0	59.8	38.3	59.5	38.7	59.3	39.1	59.0	39.4	71
61.6	37.4	61.3	37.7	61.0	38.1	60.8	38.5	60.6	38.9	60.3	39.2	60.1	39.6	59.8	40.0	72
62.4	37.9	62.2	38.3	61.9	38.7	61.7	39.1	61.5	39.4	61.2	39.8	61.0	40.2	60.7	40.6	73
63.3	38.4	63.0	38.8	62.7	39.2	62.5	39.6	62.3	40.0	62.0	40.3	61.8	40.7	61.5	41.1	74
64.1	38.9	63.9	39.3	63.6	39.7	63.4	40.1	63.2	40.5	62.9	40.9	62.6	41.3	62.4	41.7	75
65.0	39.4	64.8	39.8	64.4	40.3	64.2	40.7	64.0	41.0	63.7	41.4	63.5	41.8	63.2	42.2	76
65.8	40.0	65.6	40.3	65.3	40.8	65.1	41.1	64.8	41.6	64.5	42.0	64.3	42.4	64.0	42.8	77
66.7	40.5	66.5	40.9	66.1	41.3	65.9	41.7	65.7	42.1	65.4	42.5	65.1	42.9	64.9	43.3	78
67.5	41.0	67.3	41.4	67.0	41.9	66.7	42.3	66.5	42.7	66.2	43.1	66.0	43.5	65.7	43.9	79
68.4	41.5	68.2	41.9	67.8	42.4	67.6	42.8	67.4	43.2	67.0	43.6	66.8	44.0	66.5	44.4	80
69.3	42.0	69.0	42.4	68.6	42.9	68.4	43.3	68.2	43.7	67.9	41.1	67.6	44.6	67.3	45.0	81
70.1	42.6	69.9	43.0	69.5	43.4	69.3	43.9	69.0	44.3	68.7	44.7	68.5	45.1	68.2	45.5	82
71.0	43.1	70.7	43.5	70.4	44.0	70.1	44.4	69.5	44.8	69.6	45.2	69.3	45.7	69.0	46.1	83
71.8	43.6	71.6	44.0	71.2	44.5	71.0	44.9	70.7	45.4	70.4	45.8	70.1	46.2	69.8	46.7	84
72.7	44.1	72.4	41.5	72.1	45.0	71.8	45.5	71.6	45.9	71.2	46.3	71.0	46.8	70.7	47.2	85
73.5	44.6	73.3	45.1	72.9	45.6	72.7	45.0	72.4	46.4	72.1	46.9	71.8	47.3	71.5	47.8	86
74.4	45.2	74.1	45.6	73.8	46.1	73.5	46.5	73.3	47.0	72.9	47.4	72.6	47.9	72.3	48.3	87
75.2	45.7	75.0	46.1	74.6	46.6	74.4	47.1	74.1	47.5	73.7	48.0	73.5	48.4	73.2	48.9	88
76.1	46.2	75.8	46.6	75.5	47.2	75.2	47.6	74.9	48.1	74.6	48.5	74.3	49.0	74.0	49.4	89
77.0	46.7	76.7	47.2	76.3	47.7	76.1	48.2	75.8	48.6	75.4	49.1	75.1	49.5	74.8	50.0	90
77.8	47.2	77.5	47.7	77.2	48.2	76.9	48.7	76.6	49.1	76.3	49.6	76.0	50.1	75.7	50.6	91
78.7	47.8	78.4	48.2	78.0	48.7	77.7	49.2	77.5	49.7	77.1	50.1	76.8	50.6	76.5	51.1	92
79.5	48.3	79.2	48.7	78.9	49.3	78.6	49.8	78.3	50.2	77.9	50.7	77.7	51.2	77.3	51.7	93
80.4	48.8	80.1	49.3	79.7	49.8	79.4	50.3	79.1	50.8	78.8	51.2	78.5	51.7	78.2	52.2	94
81.2	49.3	80.9	49.8	80.6	50.3	80.3	50.8	80.0	51.3	79.6	51.8	79.3	52.3	79.0	52.8	95
82.1	49.8	81.8	50.3	81.4	50.9	81.1	51.4	80.8	51.8	80.4	52.3	80.2	52.8	79.8	53.3	96
82.9	50.3	82.6	50.8	82.3	51.4	82.0	51.8	81.7	52.4	81.3	52.9	81.0	53.4	80.6	53.9	97
83.8	50.9	83.5	51.4	83.1	51.9	82.8	52.4	82.5	52.9	82.1	53.4	81.8	53.9	81.5	54.4	98
84.6	51.4	84.3	51.9	84.0	52.5	83.7	53.0	83.4	53.5	83.0	54.0	82.7	54.5	82.3	55.0	99
85.5	51.9	85.2	52.4	84.8	53.0	84.5	53.5	84.2	54.0	83.8	54.5	83.5	55.0	83.2	55.6	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance.
58d 43m		58d 22m		58d 00m		57d 39m		57d 18m		56d 57m		56d 36m		56d 15m		
Qu. 164		Qu. 162		Qu. 158		Qu. 157		Qu 155		Qu. 153		Qu. 151		Qu. 149		

Distanc	Qu.67 +		Qu.68 +		Qu.69 +		Qu.70 +		Qu.71 +		Qu.72 +		Qu.73 +		Qu.74 +	
	34d 06m		34d 27m		34d 48m		35d 09m		35d 30m		35d 52m		36d 13m		36d 34m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6
2	01.7	01.1	01.7	01.1	01.6	01.1	01.6	01.2	01.6	01.2	01.6	01.2	01.6	01.2	01.6	01.2
3	02.5	01.7	02.5	01.7	02.5	01.7	02.5	01.7	02.4	01.7	02.4	01.8	02.4	01.8	02.4	01.8
4	03.3	02.2	03.3	02.3	03.3	02.3	03.3	02.3	03.3	02.3	03.2	02.3	03.2	02.4	03.2	02.4
5	04.2	02.8	04.1	02.8	04.1	02.9	04.1	02.9	04.1	02.9	04.1	02.9	04.0	03.0	04.0	03.0
6	05.0	03.4	05.0	03.4	04.9	03.4	04.9	03.5	04.9	03.5	04.9	03.5	04.8	03.5	04.8	03.6
7	05.8	03.9	05.8	04.0	05.7	04.0	05.7	04.0	05.7	04.1	05.7	04.1	05.6	04.1	05.6	04.2
8	06.6	04.5	06.6	04.5	06.6	04.6	06.5	04.6	06.5	04.6	05.5	04.7	06.5	04.7	06.4	04.8
9	07.5	05.0	07.4	05.1	07.4	05.1	07.4	05.2	07.3	05.2	07.3	05.3	07.3	05.3	07.2	05.4
10	08.3	05.6	08.3	05.7	08.2	05.7	08.2	05.8	08.1	05.8	08.1	05.9	08.1	05.9	08.0	06.0
11	09.1	06.2	09.1	06.2	09.0	06.3	09.0	06.3	09.0	06.4	08.9	06.4	08.9	06.5	08.8	06.6
12	10.0	06.7	09.9	06.8	09.9	06.9	09.8	06.9	09.8	07.0	09.7	07.0	09.7	07.1	09.6	07.1
13	10.8	07.3	10.7	07.4	10.7	07.4	10.6	07.5	10.6	07.6	10.5	07.6	10.5	07.7	10.4	07.7
14	11.6	07.8	11.6	07.9	11.5	08.0	11.5	08.1	11.4	08.1	11.3	08.2	11.3	08.3	11.2	08.3
15	12.5	08.4	12.4	08.5	12.3	08.6	12.3	08.6	12.2	08.7	12.2	08.8	12.1	08.9	12.0	08.9
16	13.3	09.0	13.2	09.1	13.1	09.1	13.1	09.2	13.0	09.3	13.0	09.4	12.9	09.5	12.8	09.5
17	14.1	09.5	14.0	09.6	14.0	09.7	13.9	09.8	13.8	09.9	13.8	10.0	13.7	10.0	13.6	10.1
18	14.9	10.1	14.9	10.2	14.8	10.3	14.7	10.4	14.7	10.5	14.6	10.5	14.5	10.6	14.5	10.7
19	15.8	10.6	15.7	10.8	15.6	10.8	15.5	10.9	15.5	11.0	15.4	11.1	15.3	11.2	15.3	11.3
20	16.6	11.2	16.5	11.3	16.4	11.4	16.4	11.5	16.3	11.6	16.2	11.7	16.1	11.8	16.1	11.9
21	17.4	11.8	17.3	11.9	17.2	12.0	17.2	12.1	17.1	12.2	17.0	12.3	16.9	12.4	16.9	12.5
22	18.3	12.3	18.2	12.5	18.1	12.6	18.0	12.7	17.9	12.8	17.8	12.9	17.8	13.0	17.7	13.1
23	19.1	12.9	19.0	13.0	18.9	13.1	18.8	13.2	18.7	13.4	18.6	13.5	18.6	13.6	18.5	13.7
24	19.9	13.4	19.8	13.6	19.7	13.7	19.6	13.8	19.5	13.9	19.4	14.1	19.4	14.2	19.3	14.3
25	20.8	14.0	20.6	14.2	20.5	14.3	20.5	14.4	20.4	14.5	20.3	14.7	20.2	14.8	20.1	14.9
26	21.6	14.6	21.5	14.7	21.3	14.8	21.3	15.0	21.2	15.1	21.1	15.2	21.0	15.4	20.9	15.5
27	22.4	15.1	22.3	15.3	22.2	15.4	22.1	15.6	22.0	15.7	21.9	15.8	21.8	16.0	21.7	16.1
28	23.2	15.7	23.1	15.8	23.0	16.0	22.9	16.1	22.8	16.3	22.7	16.4	12.6	16.5	22.5	16.7
29	24.1	16.2	23.9	16.4	23.8	16.6	23.7	16.7	23.6	16.8	23.5	17.0	23.4	17.1	23.3	17.3
30	24.9	16.8	24.8	17.0	24.6	17.1	24.5	17.3	24.4	17.4	24.3	17.6	24.2	17.7	24.1	17.9
31	25.7	17.4	25.6	17.5	25.5	17.7	25.4	17.9	25.2	18.0	25.1	18.2	25.0	18.3	24.9	18.5
32	26.6	17.9	26.4	18.1	26.3	18.3	26.2	18.4	26.0	18.6	25.9	18.8	25.8	18.9	25.7	19.1
33	27.4	18.5	27.2	18.7	27.1	18.8	27.0	19.0	26.9	19.2	26.7	19.3	26.6	19.5	26.5	19.7
34	28.2	19.0	28.1	19.2	27.9	19.4	27.8	19.6	27.7	19.8	27.5	19.9	27.4	20.1	27.3	20.2
35	29.1	19.6	28.9	19.8	28.7	20.0	28.6	20.2	28.5	20.3	28.4	20.5	28.2	20.7	28.1	20.8
36	29.9	20.2	29.7	20.4	29.6	20.6	29.4	20.7	29.3	20.9	29.2	21.1	29.1	21.3	28.9	21.4
37	30.7	20.7	30.5	20.9	30.4	21.1	30.3	21.3	30.1	21.5	30.0	21.7	29.9	21.9	23.7	22.9
38	31.5	21.3	31.4	21.5	31.2	21.7	31.1	21.9	30.9	22.1	30.8	22.3	30.7	22.5	30.5	22.6
39	32.4	21.8	32.2	22.1	32.0	22.3	31.9	22.5	31.7	22.7	31.6	22.9	31.5	23.0	31.3	23.2
40	33.2	22.4	33.0	22.6	32.8	22.8	32.7	23.0	32.6	23.2	32.4	23.4	32.3	23.6	32.1	23.8
41	34.0	23.0	33.8	23.2	33.7	23.4	33.5	23.6	33.4	23.8	33.2	24.0	33.1	24.2	32.9	24.4
42	34.9	23.5	34.7	23.8	34.5	24.0	34.4	24.2	34.2	24.4	34.0	24.6	33.9	24.8	33.7	25.0
43	35.7	24.1	35.5	24.3	35.3	24.6	35.2	24.8	35.0	25.0	34.8	25.2	34.7	25.4	34.5	25.6
44	36.5	24.6	36.3	24.9	36.1	25.1	36.0	25.3	35.8	25.6	35.6	25.8	35.5	26.0	35.3	26.2
45	37.4	25.2	37.1	25.5	36.9	25.7	36.8	25.9	36.6	26.1	36.5	26.4	36.3	26.6	36.1	26.8
46	38.2	25.8	38.0	26.0	37.8	26.3	37.6	26.5	37.4	26.7	37.3	27.0	37.1	27.2	36.9	27.4
47	39.0	26.3	38.8	26.6	38.6	26.8	38.4	27.1	38.3	27.3	38.1	27.5	37.9	27.8	37.7	28.0
48	39.8	26.9	39.6	27.2	39.4	27.4	39.3	27.6	39.1	27.9	38.9	28.1	38.7	28.4	38.5	28.6
49	40.7	27.4	40.4	27.7	40.2	28.0	40.1	28.2	39.9	28.5	39.5	28.7	39.5	29.0	39.3	29.2
50	41.5	28.0	41.3	28.3	41.1	28.6	40.9	28.8	40.7	29.1	40.7	29.3	40.4	29.6	40.2	29.8
Distanc	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	55d 54m		55d 33m		55d 12m		54d 51m		54d 30m		54d 08m		53d 47m		53d 26m	
	Qu. 148		Qu. 145		Qu. 143		Qu. 142		Qu. 140		Qu. 138		Qu. 136		Qu. 134	

4¼ Pts.

Qu. 67+		Qu. 68+		Qu. 69+		Qu. 70+		Qu. 71+		Qu. 72+		Qu. 73+		Qu. 74+		Distance.
34d 06m		34d 27m		34d 48m		35d 09m		35d 30m		35d 52m		36d 13m		36d 34m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
42.3	28.6	42.1	28.9	41.9	29.1	41.7	29.4	41.5	29.6	41.3	29.9	41.2	30.1	41.0	30.4	51
43.2	29.1	42.9	29.4	42.7	29.7	42.5	30.0	42.3	30.2	42.1	30.5	42.0	30.7	41.8	31.0	52
44.0	29.7	43.7	30.0	43.5	30.3	43.4	30.5	43.1	30,8	42.9	31.1	42.8	31.3	42.6	31.6	53
44.8	30.2	44.6	30.6	44.3	30.8	44.2	31.1	44.0	31.4	43.7	31.6	43.6	31.9	43.4	32.2	54
45.7	30.8	45.4	31.1	45.2	31.4	45.0	31.7	44.8	32.0	44.6	32.2	44.4	32.5	44.2	32.8	55
46.5	31.4	46.2	31.7	46.0	32.0	45.8	32.3	45.6	32.5	45.4	32.8	45.2	33.1	45.0	33.3	56
47.3	31.9	47.0	32.3	46.8	32.5	46.6	32.8	46.4	33.1	46.2	33.4	46.0	33.7	45.8	33.9	57
48.1	32.5	47.9	32.8	47.6	33.1	47.4	33.4	47.2	33.7	47.0	34.0	46.8	34.3	46.6	34.5	58
49.0	33.0	48.7	33.4	48.4	33.7	48.3	34.0	48.0	34.3	47.8	34.6	47.6	34.9	47.4	35.1	59
49.8	33.6	49.5	34.0	49.3	34.3	49.1	34.6	48.8	34.9	48.6	35.2	48.4	35.5	48.2	35.7	60
50.6	34.2	50.3	34.5	50.1	34.8	49.9	35.1	49.7	35.4	49.4	35.7	49.2	36.1	49.0	36.3	61
51.5	34.7	51.2	35.1	50.9	35.4	50.7	35.7	50.5	36.0	50.2	36.3	50.0	36.6	49.8	36.9	62
52.3	35.3	52.0	35.7	51.7	36.0	51.5	36.3	51.3	36.6	51.0	36.9	50.8	37.2	50.6	37.5	63
53.1	35.8	52.8	36.2	52.5	36.5	52.4	36.9	52.1	37.2	51.8	37.5	51.6	37.8	51.4	38.1	64
54.0	36.4	53.6	36.8	53.4	37.1	53.2	37.4	52.9	37.8	52.7	38.1	52.5	38.4	52.2	38.7	65
54.8	37.0	54.5	37.4	54.2	37.7	54.0	38.0	53.7	38.3	53.5	38.7	53.3	39.0	53.0	39.3	66
55.6	37.5	55.3	37.9	55.0	38.3	54.8	38.6	54.5	38.9	54.4	39.3	54.1	39.6	53.8	39.9	67
56.4	38.1	56.1	38.5	55.8	38.8	55.6	39.2	55.4	39.5	55.1	39.8	54.9	40.2	54.6	40.5	68
57.3	38.6	56.9	39.1	56.7	39.4	56.4	39.7	56.2	40.1	55.9	40.4	55.7	40.8	55.4	41.1	69
58.1	39.2	57.8	39.6	57.5	40.0	57.3	40.3	57.0	40.7	56.7	41.0	56.5	41.4	56.2	41.7	70
58.9	39.8	58.6	40.2	58.3	40.5	58.1	40.9	57.8	41.3	57.5	41.6	57.3	42.0	57.0	42.3	71
59.8	40.3	59.4	40.8	59.1	41.1	58.9	41.5	58.6	41.8	58.3	42.2	58.1	42.6	57.8	42.9	72
60.6	40.9	60.2	41.3	59.9	41.7	59.7	42.0	59.4	42.4	59.1	42.8	58.9	43.1	58.6	43.5	73
61.4	41.4	61.1	41.9	60.8	42.3	60.5	42.6	60.2	43.0	59.9	43.4	59.7	43.7	59.4	44.1	74
62.3	42.0	61.9	42.5	61.6	42.8	61.4	43.2	61.1	43.6	60.8	44.0	60.5	44.3	60.2	44.7	75
63.1	42.6	62.7	43.0	62.4	43.4	62.2	43.8	61.9	44.2	61.6	44.5	61.3	44.9	61.0	45.3	76
63.9	43.1	63.5	43.6	63.2	44.0	63.0	44.4	62.7	44.7	62.4	45.1	62.1	45.5	61.8	45.9	77
64.7	43.7	64.4	44.1	64.0	44.5	63.8	44.9	63.5	45.3	63.2	45.7	62.9	46.1	62.7	46.5	78
65.6	44.2	65.2	44.7	64.9	45.1	64.6	45.5	64.3	45.9	64.0	46.3	63.8	46.7	63.5	47.1	79
66.2	44.8	66.0	45.3	65.7	45.7	65.4	46.1	65.1	46.5	64.8	46.9	64.6	47.3	64.3	47.7	80
67.2	45.4	66.8	45.8	66.5	46.3	66.3	46.7	65.9	47.1	65.6	47.5	65.4	47.9	65.1	48.3	81
68.1	45.9	67.7	46.4	67.3	46.8	67.1	47.2	66.7	47.6	66.4	48.1	66.2	48.5	65.9	48.8	82
68.9	46.5	68.5	47.0	68.1	47.4	67.9	47.8	67.6	48.2	67.2	48.6	67.0	49.1	66.7	49.4	83
69.6	47.0	69.3	47.5	69.0	48.0	68.7	48.4	68.4	48.8	68.0	49.2	67.8	49.6	67.5	50.0	84
70.6	47.6	70.1	48.1	69.8	48.5	69.5	49.0	69.2	49.4	68.9	49.8	68.6	50.2	68.3	50.6	85
71.4	48.2	70.9	48.7	70.6	49.1	70.3	49.5	70.0	50.0	69.7	50.4	69.4	50.8	69.1	51.2	86
72.2	48.7	71.8	49.2	71.4	49.7	71.2	50.1	70.8	50.6	70.5	51.0	70.2	51.4	69.9	51.8	87
73.0	49.3	72.6	49.8	72.3	50.2	72.0	50.7	71.6	51.1	71.3	51.6	71.0	52.0	70.7	52.4	88
73.9	49.8	73.4	50.4	73.1	50.8	72.8	51.3	72.4	51.7	72.1	52.2	71.8	52.6	71.5	53.0	89
74.5	50.4	74.3	50.9	73.9	51.4	73.6	51.8	73.3	52.3	72.9	52.7	72.6	53.2	72.3	53.6	90
75.6	51.0	75.1	51.5	74.7	52.0	74.4	52.4	74.1	52.9	73.7	53.3	73.4	53.8	73.1	54.2	91
76.4	[illegible]	75.9	52.1	75.5	52.5	75.3	53.0	74.9	53.4	74.5	53.9	74.2	54.4	73.9	54.8	92
77.2	52.1	76.7	52.6	76.4	53.1	76.1	53.6	75.7	54.0	75.3	54.5	75.1	55.0	74.7	55.4	93
78.0	52.6	77.6	53.2	77.2	53.7	76.9	54.1	76.5	54.6	76.1	55.1	75.9	55.6	75.5	56.0	94
78.6	53.2	78.4	53.8	78.0	54.2	77.7	54.7	77.3	55.2	77.0	55.7	76.7	56.1	76.3	56.6	95
79.7	53.8	79.2	54.3	78.8	54.8	78.5	55.3	78.1	55.8	77.8	56.3	77.5	56.7	77.1	57.2	96
80.5	54.3	80.0	54.9	79.6	55.4	79.3	55.9	79.0	56.4	78.6	56.8	78.3	57.3	77.9	57.8	97
81.3	54.9	80.9	55.5	80.5	56.0	80.2	56.4	79.8	56.9	79.4	57.4	79.1	57.9	78.7	58.4	98
82.1	[illegible]	81.7	56.0	81.3	56.5	81.0	57.0	80.6	57.5	80.2	58.0	79.9	58.5	79.5	59.0	99
82.9	56.0	82.5	56.6	82.1	57.1	81.8	57.6	81.4	58.1	81.0	58.6	80.7	59.1	80.3	59.6	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance
55d 54m		55d 33m		55d 12m		54d 51m		54d 30m		54d 08m		53d 47m		53d 26m		
Qu. 148		Qu. 145		Qu. 143		Qu. 142		Qu. 140		Qu. 138		Qu. 136		Qu. 134		

$4\frac{1}{4}$ Pts.

3½ Pt.

Distanc	Qu.75		Qu.76		Qu.77		Qu.78		Qu.79		Qu.80		Qu.81		Qu.82	
	36d 55m		37d 16m		37d 37m		37d 58m		38d 19m		38d 40m		39d 01m		39d 22m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.6
2	01.6	01.2	01.6	01.2	01.6	01.2	01.6	01.2	01.6	01.2	01.6	01.3	01.6	01.3	01.5	01.3
3	02.4	01.8	02.4	01.8	02.4	01.8	02.4	01.8	02.4	01.9	02.3	01.9	02.3	01.9	02.3	01.9
4	03.2	02.4	03.2	02.4	03.2	02.4	03.2	02.5	03.1	02.5	03.1	02.5	03.1	02.5	03.1	02.5
5	04.0	03.0	04.0	03.0	04.0	03.1	03.0	03.1	03.9	03.1	03.9	03.1	03.9	03.2	03.9	03.2
6	04.8	03.6	04.8	03.6	04.8	03.7	04.7	03.7	04.7	03.7	04.7	03.8	04.7	03.8	04.6	03.8
7	05.6	04.2	05.6	04.2	05.5	04.3	05.5	04.3	05.5	04.3	05.5	04.4	05.4	04.4	05.4	04.4
8	06.4	04.8	06.4	04.8	06.3	04.9	06.3	04.9	06.3	05.0	06.2	05.0	06.2	05.0	06.2	05.1
9	07.2	05.4	07.2	05.4	07.1	05.5	07.1	05.5	07.1	05.6	07.0	05.6	07.0	05.7	07.0	05.7
10	08.0	06.0	08.0	06.1	07.9	06.1	07.9	06.2	07.9	06.2	07.8	06.3	07.8	06.3	07.7	06.3
11	08.8	06.6	08.8	06.7	08.7	06.7	08.7	06.8	08.6	06.8	08.6	06.9	08.5	06.9	08.5	07.0
12	09.6	07.2	09.6	07.3	09.5	07.3	09.5	07.4	09.4	07.4	09.4	07.5	09.3	07.6	09.3	07.6
13	10.4	07.8	10.3	07.9	10.3	07.9	10.2	08.0	10.2	08.1	10.2	08.1	10.1	08.2	10.0	08.2
14	11.2	08.4	11.1	08.5	11.1	08.5	11.0	08.6	11.0	08.7	10.9	08.8	10.9	08.8	10.8	08.9
15	12.0	09.0	11.9	09.1	11.9	09.2	11.8	09.2	11.8	09.3	11.7	09.4	11.7	09.5	11.6	09.5
16	12.8	09.6	12.7	09.7	12.7	09.8	12.6	09.8	12.6	09.9	12.5	10.0	12.4	10.1	12.4	10.1
17	13.6	10.2	13.5	10.3	13.5	10.4	13.4	10.5	13.3	10.5	13.3	10.6	13.2	10.7	13.1	10.8
18	14.4	10.8	14.3	10.9	14.3	11.0	14.2	11.1	14.1	11.2	14.1	11.3	14.0	11.3	13.9	11.4
19	15.2	11.4	15.1	11.5	15.0	11.6	15.0	11.7	14.9	11.8	14.8	11.9	14.8	12.0	14.7	12.0
20	16.0	12.0	15.9	12.1	15.8	12.2	15.8	12.3	15.7	12.4	15.6	12.5	15.5	12.6	15.5	12.7
21	16.8	12.6	16.7	12.7	16.6	12.8	16.5	12.9	16.5	13.0	16.4	13.1	16.3	13.2	16.2	13.3
22	17.6	13.2	17.5	13.3	17.4	13.4	17.3	13.5	17.3	13.6	17.2	13.8	17.1	13.9	17.0	14.0
23	18.4	13.8	18.3	13.9	18.2	14.0	18.1	14.1	18.1	14.3	18.0	14.4	17.9	14.5	17.8	14.6
24	19.2	14.4	19.1	14.5	19.0	14.6	18.9	14.8	18.8	14.9	18.7	15.0	18.6	15.1	18.5	15.2
25	20.0	15.0	19.9	15.1	19.8	15.3	19.7	15.4	19.6	15.5	19.5	15.6	19.4	15.8	19.3	15.9
26	20.8	15.6	20.7	15.7	20.6	15.9	20.5	16.0	20.4	16.1	20.3	16.3	20.2	16.4	20.1	16.5
27	21.6	16.2	21.5	16.3	21.4	16.5	21.3	16.6	21.2	16.7	21.1	16.9	21.0	17.0	20.9	17.1
28	22.4	16.8	22.3	16.9	22.2	17.1	22.1	17.2	22.0	17.4	21.9	17.5	21.8	17.6	21.6	17.8
29	23.2	17.4	23.1	17.5	23.0	17.7	22.9	17.8	22.8	18.0	22.6	18.1	22.5	18.3	22.4	18.4
30	24.0	18.0	23.9	18.2	23.8	18.3	23.6	18.5	23.6	18.6	23.4	18.8	23.3	18.9	23.2	19.0
31	24.8	18.6	24.7	18.8	24.6	18.9	24.4	19.1	24.3	19.2	24.2	19.4	24.1	19.5	24.0	19.7
32	25.6	19.2	25.5	19.4	25.3	19.5	25.2	19.7	25.1	19.8	25.0	20.0	24.9	20.2	24.7	20.3
33	26.4	19.8	26.3	20.0	26.1	20.1	26.0	20.3	25.9	20.5	25.8	20.6	25.6	20.8	25.5	20.9
34	27.2	20.4	27.1	20.6	26.9	20.7	26.8	20.9	26.7	21.1	26.6	21.3	26.4	21.4	26.3	21.6
35	28.0	21.0	27.9	21.2	27.7	21.4	27.6	21.5	27.5	21.7	27.3	21.9	27.2	22.1	27.0	22.2
36	28.8	21.6	28.7	21.8	28.5	22.0	28.4	22.1	28.3	22.3	28.1	22.5	28.0	22.7	27.8	22.8
37	29.6	22.2	29.5	22.4	29.3	22.6	29.2	22.8	29.0	22.9	28.9	23.1	28.7	23.3	28.6	23.5
38	30.4	22.8	30.2	23.0	30.1	23.2	29.9	23.4	29.8	23.6	29.7	23.8	29.5	23.9	29.4	24.1
39	31.2	23.4	31.0	23.6	30.9	23.8	30.7	24.0	30.6	24.2	30.5	24.4	30.3	24.6	30.1	24.7
40	32.0	24.0	31.8	24.2	31.7	24.4	31.5	24.6	31.4	24.8	31.2	25.0	31.1	25.2	30.9	25.4
41	32.8	24.6	32.6	24.8	32.5	25.0	32.3	25.2	32.2	25.4	32.0	25.6	31.9	25.8	31.7	26.0
42	33.6	25.2	33.4	25.4	33.3	25.6	33.1	25.8	33.0	26.0	32.8	26.3	32.6	26.5	32.5	26.6
43	34.4	25.8	34.2	26.0	34.1	26.2	33.9	26.4	33.8	26.7	33.6	26.9	33.4	27.1	33.2	27.3
44	35.2	26.4	35.0	26.6	34.8	26.8	34.7	27.1	34.5	27.3	34.4	27.5	34.2	27.7	34.0	27.9
45	36.0	27.0	35.8	27.2	35.6	27.5	35.5	27.7	35.3	27.9	35.1	28.1	35.0	28.4	34.8	28.5
46	36.8	27.6	36.6	27.8	36.4	28.1	36.2	28.3	36.1	28.5	35.9	28.8	35.7	29.0	35.6	29.2
47	37.6	28.2	37.4	28.4	37.2	28.7	37.0	28.9	36.9	29.1	36.7	29.4	36.5	29.6	36.3	29.8
48	38.4	28.8	38.2	29.0	38.0	29.3	37.8	29.5	37.7	29.8	37.5	30.0	37.3	30.2	37.1	30.4
49	39.2	29.4	39.0	29.6	38.8	29.9	38.6	30.1	38.5	30.4	38.3	30.6	38.1	30.9	37.9	31.1
50	40.0	30.1	39.8	30.3	39.6	30.5	39.4	30.8	39.3	31.0	39.1	31.3	38.9	31.5	38.6	31.7
Distanc	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	53d 05m		52d 44m		52d 23m		52d 02m		51d 41m		51d 20m		50d 59m		50d 38m	
	Qu. 133		Qu. 131		Qu. 129		Qu. 128		Qu. 126		Qu. 125		Qu. 123		Qu. 121	

4½ Pts

Qu.75		Qu.76		Qu.77		Qu.78		Qu.79		Qu.80		Qu.81		Qu.82		Distance.
36d 55m		37d 16m		37d 37m		37d 58m		38d 19m		38d 40m		39d 01m		39d 22m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
40.8	30.7	40.6	30.9	40.4	31.1	40.2	31.4	40.0	31.6	39.8	31.9	39.6	32.1	39.4	32.3	51
41.6	31.3	41.4	31.5	41.2	31.7	41.0	32.0	40.8	32.2	40.6	32.5	40.4	32.8	40.2	33.0	52
42.4	31.9	42.2	32.1	42.0	32.3	41.8	32.6	41.6	32.9	41.4	33.1	41.2	33.4	41.0	33.6	53
43.2	32.5	43.0	32.7	42.8	32.9	42.6	33.2	42.4	33.5	42.2	33.8	42.0	34.0	41.7	34.3	54
44.0	33.1	43.8	33.3	43.6	33.6	43.3	33.8	43.2	34.1	43.0	34.4	42.7	34.7	42.5	34.9	55
44.8	33.7	44.6	33.9	44.4	34.2	44.1	34.4	44.0	34.7	43.7	35.0	43.5	35.3	43.3	35.5	56
45.6	34.3	45.4	34.5	45.1	34.8	44.9	35.1	44.7	35.3	44.5	35.6	44.3	35.9	44.1	36.2	57
46.4	34.9	46.2	35.1	45.9	35.4	45.7	35.7	45.5	36.0	45.3	36.3	45.1	36.5	44.8	36.8	58
47.2	35.5	47.0	35.7	46.7	36.0	46.5	36.3	46.3	36.6	46.1	36.9	45.8	37.2	45.6	37.4	59
48.0	36.1	47.8	36.3	47.5	36.6	47.3	36.9	47.1	37.2	46.9	37.5	46.6	37.8	46.4	38.1	60
48.8	36.7	48.6	36.9	48.3	37.2	48.1	37.5	47.9	37.8	47.6	38.1	47.4	38.4	47.1	38.7	61
49.6	37.3	49.4	37.5	49.1	37.8	48.9	38.1	48.7	38.4	48.4	38.8	48.2	39.1	47.9	39.3	62
50.4	37.9	50.1	38.1	49.9	38.4	49.6	38.7	49.5	39.1	49.2	39.4	49.0	39.7	48.7	40.0	63
51.2	38.5	50.9	38.7	50.7	39.0	50.4	39.4	50.2	39.7	50.0	40.0	49.7	40.3	49.5	40.6	64
52.0	39.1	51.7	39.3	51.5	39.7	51.2	40.0	51.0	40.3	50.8	40.6	50.5	41.0	50.2	41.2	65
52.8	39.7	52.5	39.9	52.3	40.3	52.0	40.6	51.8	40.9	51.5	41.3	51.3	41.6	51.0	41.9	66
53.6	40.3	53.3	40.5	53.1	40.9	52.8	41.2	52.6	41.5	52.3	41.9	52.1	42.2	51.8	42.5	67
54.4	40.9	54.1	41.1	53.9	41.5	53.6	41.8	53.4	42.2	53.1	42.5	52.8	42.8	52.6	43.1	68
55.2	41.5	54.9	41.7	54.6	42.1	54.4	42.4	54.2	42.8	53.9	43.1	53.6	43.5	53.3	43.8	69
56.0	42.1	55.7	42.4	55.4	42.7	55.2	43.1	55.0	43.4	54.7	43.8	54.4	44.1	54.1	44.4	70
56.8	42.7	56.5	43.0	56.2	43.3	55.9	43.7	55.7	44.0	55.5	44.4	55.2	44.7	54.9	45.0	71
57.6	43.3	57.3	43.6	57.0	43.9	56.7	44.3	56.5	44.6	56.2	45.0	55.9	45.4	55.7	45.7	72
58.4	43.9	58.1	44.2	57.8	44.5	57.5	44.9	57.3	45.3	57.0	45.6	56.7	46.0	56.4	46.3	73
59.2	44.5	58.9	44.8	58.6	45.1	58.3	45.5	58.1	45.9	57.8	46.3	57.5	46.6	57.2	46.9	74
60.0	45.1	59.7	45.4	59.4	45.8	59.1	46.1	58.9	46.5	58.6	46.9	58.3	47.3	58.0	47.6	75
60.8	45.7	60.5	46.0	60.2	46.4	55.9	46.7	59.7	47.1	59.4	47.5	59.1	47.9	58.7	48.2	76
61.6	46.3	61.3	46.6	61.0	47.0	60.7	47.4	60.4	47.7	60.1	48.1	59.8	48.5	59.5	48.8	77
62.4	46.9	62.1	47.2	61.8	47.6	61.5	48.0	61.2	48.4	60.9	48.8	60.6	49.1	60.3	49.5	78
63.2	47.5	62.9	47.8	62.6	48.2	62.3	48.6	62.0	49.0	61.7	49.4	61.4	49.8	61.1	50.1	79
64.0	48.1	63.7	48.4	63.4	48.8	63.0	49.2	62.8	49.6	61.5	50.0	62.2	50.4	61.8	50.7	80
64.8	48.7	64.5	59.0	64.2	49.4	63.8	49.8	63.6	50.2	63.3	50.6	62.9	51.0	62.6	51.4	81
65.6	49.3	65.3	49.6	64.9	50.0	64.6	50.4	64.4	50.8	64.0	51.3	63.7	51.7	63.4	52.0	82
66.4	49.9	66.1	50.2	65.7	50.6	65.4	51.0	65.2	51.5	64.8	51.9	64.5	52.3	64.2	52.6	83
67.2	50.5	66.9	50.8	66.5	51.2	66.2	51.7	65.9	52.1	65.6	52.5	65.3	52.9	64.9	53.3	84
68.0	51.1	67.7	51.4	67.3	51.9	67.0	52.3	66.7	52.7	66.4	53.1	66.0	53.6	65.7	53.9	85
68.8	51.7	68.5	52.0	68.1	52.5	67.8	52.9	67.5	53.3	67.2	53.8	66.8	54.2	66.5	54.6	86
69.6	52.3	69.3	52.6	68.9	53.1	68.6	53.5	68.3	53.9	67.9	54.4	67.6	54.8	67.2	55.2	87
70.4	52.9	70.0	53.2	69.7	53.7	69.3	54.1	69.1	54.6	68.7	55.0	68.4	55.4	68.0	55.8	88
71.2	53.5	70.8	53.8	70.5	54.3	70.1	54.7	69.9	55.2	69.5	55.6	69.2	56.1	68.8	56.5	89
72.0	54.1	71.6	54.5	71.3	54.9	70.9	55.4	70.7	55.8	70.3	56.3	69.9	56.7	69.6	57.1	90
72.8	54.7	72.4	55.1	72.1	55.5	71.7	56.0	71.4	56.4	71.1	56.9	70.7	57.3	70.3	57.7	91
73.6	55.3	73.2	55.7	72.9	56.1	72.5	56.6	72.2	57.0	71.9	57.5	71.5	58.0	71.1	58.4	92
74.4	55.9	74.0	56.3	73.7	56.7	73.3	57.2	73.0	57.7	72.6	58.1	72.3	58.6	71.9	59.0	93
75.2	56.5	74.8	56.9	74.4	57.3	74.1	57.8	73.8	58.3	73.4	58.8	73.0	59.2	72.7	59.6	94
76.0	57.1	75.6	57.5	75.2	58.0	74.9	58.4	74.6	58.9	74.2	59.4	73.8	59.9	73.4	60.3	95
76.8	57.7	76.4	58.1	76.0	58.6	75.6	59.0	75.4	59.5	75.0	60.0	74.6	60.5	74.2	60.9	96
77.6	58.3	77.2	58.7	76.8	59.2	76.4	59.7	76.1	60.1	75.8	60.6	75.4	61.1	75.0	61.5	97
78.4	58.9	78.0	59.3	77.6	59.8	77.2	60.3	76.9	60.8	76.5	61.3	76.7	61.7	75.7	62.2	98
79.2	59.5	78.8	59.9	78.4	60.4	78.0	60.9	77.7	61.4	77.3	61.9	76.9	62.4	76.5	62.8	99
80.0	60.1	79.6	60.5	79.2	61.0	78.8	61.5	78.5	62.0	78.1	62.5	77.7	63.0	77.3	63.4	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance.
53d 05m		52d 44m		52d 23m		52d 02m		51d 41m		51d 20m		50d 59m		50d 38m		
Qu. 133		Qu. 131		Qu. 129		Qu. 128		Qu. 126		Qu. 125		Qu. 123		Qu. 121		

2¼ Pt

Distance	Qu. 83		Qu. 84		Qu. 85		Qu. 86		Qu. 87		Qu. 88		Qu. 89		Qu. 90	
	39d 44m		40d 05m		40d 26m		40d 47m		41d 08m		41d 29m		41d 50m		42d 11m	
	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep
1	00.8	00.6	00.8	00.6	00.8	00.6	00.8	00.7	00.8	00.7	00.7	00.7	00.7	00.7	00.7	00.7
2	01.5	01.3	01.5	01.3	01.5	01.3	01.5	01.3	01.5	01.3	01.5	01.3	01.5	01.3	01.5	01.3
3	02.3	01.9	02.3	01.9	02.3	01.9	02.3	02.0	02.3	02.0	02.2	02.0	02.3	02.0	02.2	02.0
4	03.1	02.6	03.1	02.6	03.0	02.6	03.0	02.6	03.0	02.6	03.0	02.6	03.0	02.7	03.0	02.7
5	03.8	03.2	03.8	03.2	03.8	03.2	03.8	03.3	03.8	03.3	03.7	03.3	03.7	03.3	03.7	03.4
6	04.6	03.8	04.6	03.9	04.6	03.9	04.5	03.9	04.5	03.9	04.5	04.0	04.5	04.0	04.4	04.0
7	05.4	04.5	05.4	04.5	05.3	04.5	05.3	04.6	05.3	04.6	05.2	04.6	05.2	04.7	05.2	04.7
8	06.2	05.1	06.1	04.2	06.1	05.2	06.1	05.3	06.0	05.3	06.0	05.3	06.0	05.3	05.9	05.4
9	06.9	05.8	06.9	05.8	06.8	05.8	06.8	05.9	06.8	05.9	06.7	06.0	06.7	06.0	06.7	06.0
10	07.7	06.4	07.7	06.4	07.6	06.5	07.6	06.5	07.5	06.6	07.5	06.6	07.5	06.7	07.4	06.7
11	08.5	07.0	08.4	07.1	08.4	07.1	08.3	07.2	08.3	07.2	08.2	07.3	08.2	07.3	08.1	07.4
12	09.2	07.7	09.2	07.7	09.1	07.8	09.1	07.8	09.0	07.9	09.0	07.9	08.9	08.0	08.9	08.1
13	10.0	08.3	09.9	08.4	09.9	08.5	09.8	08.5	09.8	08.6	09.7	08.6	09.7	08.7	09.6	08.7
14	10.8	08.9	10.7	09.0	10.7	09.1	10.6	09.1	10.5	09.2	10.5	09.3	10.4	09.3	10.4	09.4
15	11.5	09.6	11.5	09.7	11.4	09.7	11.4	09.8	11.3	09.9	11.2	09.9	11.2	10.0	11.1	10.1
16	12.3	10.2	12.2	19.3	12.2	10.4	12.1	10.4	12.0	10.5	12.0	10.6	11.9	10.7	11.9	10.9
17	13.1	10.9	13.0	10.9	12.9	11.0	12.9	11.1	12.8	11.2	12.7	11.3	12.7	11.3	12.6	11.4
18	13.8	11.5	13.8	11.6	13.7	11.7	13.6	11.8	13.6	11.8	13.5	11.9	13.4	12.0	13.3	12.1
19	14.6	12.1	14.5	12.2	14.5	12.3	14.4	12.4	14.3	12.5	14.2	12.6	14.2	12.7	14.1	12.8
20	15.4	12.8	15.3	12.9	15.2	13.0	15.1	13.1	15.1	13.2	15.0	13.2	14.9	13.3	14.8	13.4
21	16.1	13.4	16.1	13.5	16.0	13.6	15.9	18.7	15.8	13.8	15.7	13.9	15.6	14.0	15.6	14.1
22	16.9	14.1	16.8	14.2	16.7	14.3	16.7	14.4	16.6	14.5	16.5	14.6	16.4	14.7	16.3	14.8
23	17.7	14.7	17.6	14.8	17.5	14.9	17.4	15.0	17.3	15.1	17.2	15.2	17.1	15.3	17.0	15.4
24	18.5	15.3	18.4	15.5	18.3	15.6	18.2	15.7	18.1	15.8	18.0	15.9	17.9	16.0	17.8	16.1
25	19.2	16.0	19.1	16.1	19.0	16.2	18.9	16.3	18.8	16.5	18.7	16.6	18.6	16.7	18.5	16.8
26	20.0	16.6	19.9	16.7	19.8	16.8	19.7	17.0	19.6	17.1	19.5	17.2	19.4	17.3	19.3	17.4
27	20.8	17.3	20.7	17.4	20.5	17.5	20.4	17.6	20.3	17.8	20.2	17.9	20.1	18.0	20.0	18.1
28	21.5	17.9	21.4	18.0	21.3	18.1	21.2	18.3	21.1	18.4	21.0	18.5	20.9	18.7	20.7	18.8
29	22.3	18.5	22.2	18.7	22.1	18.8	22.0	18.9	21.8	19.1	21.7	19.2	21.6	19.3	21.5	19.5
30	23.1	19.2	23.0	19.3	22.8	19.4	22.7	19.6	22.6	19.7	22.5	19.9	22.4	20.0	22.2	20.1
31	23.8	19.8	23.7	20.0	23.6	20.1	23.5	20.2	23.3	20.4	23.2	20.5	23.1	20.7	23.0	20.8
32	24.6	20.4	24.5	20.6	24.4	20.7	24.2	20.9	24.1	21.1	24.0	21.2	23.8	21.3	23.7	21.5
33	25.4	21.1	25.2	21.3	25.1	21.4	25.0	21.5	24.8	21.7	24.7	21.8	24.6	22.0	24.4	22.2
34	26.1	21.7	26.0	21.9	25.9	22.0	25.7	22.2	25.6	22.4	25.5	22.5	25.3	22.7	25.2	22.8
35	26.9	22.4	26.8	22.5	26.6	22.7	26.5	22.9	26.4	23.0	26.2	23.2	26.1	23.3	25.9	23.5
36	27.7	23.0	27.5	23.2	27.4	23.3	27.3	23.5	27.1	23.7	27.0	23.8	26.8	24.0	26.7	24.2
37	28.5	23.6	28.3	23.8	28.2	24.0	28.0	24.2	27.9	24.3	27.7	24.5	27.6	24.7	27.4	24.8
38	29.2	24.3	29.1	24.5	28.9	24.7	28.8	24.9	28.6	25.0	28.5	25.2	28.3	25.3	28.2	25.5
39	30.0	24.9	29.8	25.1	29.7	25.3	29.5	25.5	29.4	25.7	29.2	25.8	29.1	26.0	28.9	26.2
40	30.8	25.6	30.6	25.8	30.4	25.9	30.3	26.1	30.1	26.3	30.0	26.5	29.8	26.7	29.6	26.9
41	31.5	26.2	31.4	26.4	31.2	26.6	31.0	26.8	30.9	27.0	30.7	27.1	30.5	27.3	30.4	27.5
42	32.3	26.8	32.1	27.0	32.0	27.2	31.8	27.4	31.6	27.6	31.5	27.8	31.3	28.0	31.1	28.2
43	33.1	27.5	32.9	27.7	32.7	27.9	32.6	28.1	32.4	28.3	32.2	28.4	32.0	28.7	31.9	28.9
44	33.8	28.1	33.7	28.3	33.5	28.5	33.3	28.7	33.1	29.0	33.0	29.1	32.8	29.3	32.6	29.5
45	34.6	28.8	34.4	29.0	34.2	29.2	34.1	29.4	33.9	29.6	33.7	29.8	33.5	30.0	33.3	30.2
46	35.4	29.4	35.2	29.6	35.0	29.8	34.8	30.0	34.6	30.3	34.5	30.5	34.3	30.7	34.1	30.9
47	36.1	30.0	36.0	30.3	35.8	30.5	35.6	30.7	35.4	30.9	35.2	31.1	35.0	31.3	34.8	31.6
48	36.9	30.7	36.7	30.9	36.5	31.1	36.3	31.3	36.2	31.6	36.0	31.8	35.8	32.0	35.6	32.2
49	37.7	31.3	37.5	31.6	37.3	31.8	37.1	32.0	36.9	32.2	36.7	32.4	36.5	32.7	36.3	32.9
50	38.5	32.0	38.3	32.2	38.1	32.4	37.9	32.7	37.7	32.9	37.5	33.1	37.3	33.4	37.1	33.6
Distance	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat
	50d 16m		49d 55m		49d 34m		49d 13m		48d 52m		48d 31m		48d 10m		47d 49	
	Qu. 120		Qu. 118		Qu. 117		Qu. 116		Qu. 114		Qu. 113		Qu. 111		Qu. 11	

4¾ Pts

Qu. 83		Qu. 84		Qu. 85		Qu. 86		Qu. 87		Qu. 88		Qu. 89		Qu. 90.		Distance.
39d 44m		40d 05m		40d 26m		40d 47m		41d 08m		41d 29m		41d 50m		42d 11m		
Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	
39.2	32.6	39.0	32.8	38.8	33.1	38.6	33.3	38.4	33.6	38.2	33.8	38.0	34.0	37.8	34.2	51
40.0	33.2	39.8	33.5	39.6	33.7	39.4	34.0	39.2	34.2	38.9	34.4	38.7	34.7	38.5	34.9	52
40.8	33.9	40.5	34.1	40.3	34.4	40.1	34.6	39.9	34.9	39.7	35.1	39.5	35.4	39.3	35.6	53
41.5	34.5	41.3	34.8	41.1	35.0	40.9	35.3	40.7	35.5	40.4	35.7	40.2	36.0	40.0	36.3	54
42.3	35.2	42.1	35.4	41.9	35.6	41.6	35.9	41.4	36.2	41.2	36.4	41.0	36.7	40.7	36.9	55
43.1	35.8	42.8	36.1	42.6	36.3	42.4	36.6	42.2	36.8	41.9	37.1	41.7	37.4	41.5	37.6	56
43.8	36.4	43.6	36.7	43.4	36.9	43.1	37.2	42.9	37.5	42.7	37.7	42.5	38.0	42.2	38.3	57
44.6	37.1	44.4	37.4	44.1	37.6	43.9	37.9	43.7	38.2	43.4	38.4	43.2	38.7	43.0	38.9	58
45.4	37.7	45.1	38.0	44.9	38.3	44.7	38.5	44.4	38.8	44.2	39.1	44.0	39.4	43.7	39.6	59
46.1	38.3	45.9	38.6	45.7	38.9	45.4	39.2	45.2	39.5	44.9	39.7	44.7	40.0	44.5	40.3	60
46.9	39.0	46.7	39.3	46.4	39.5	46.2	39.8	45.9	40.1	45.7	40.4	45.4	40.7	45.2	41.0	61
47.7	39.6	47.4	39.9	47.2	40.2	46.9	40.5	46.7	40.8	46.4	41.0	46.2	41.4	45.9	41.6	62
48.4	40.3	48.2	40.6	47.9	40.9	47.7	41.1	47.4	41.5	47.2	41.7	47.0	42.0	46.7	42.3	63
49.2	40.9	49.0	41.2	48.7	41.5	48.4	41.8	48.2	42.1	47.9	42.4	47.7	42.7	47.4	43.0	64
50.0	41.5	49.7	41.9	49.5	42.1	49.2	42.4	48.9	42.8	48.7	43.0	48.4	43.4	48.2	43.6	65
50.8	42.2	50.5	42.5	50.2	42.8	50.0	43.1	49.7	43.4	49.4	43.7	49.2	44.0	48.9	44.3	66
51.5	42.8	51.3	43.1	51.0	43.4	50.7	43.8	50.5	44.1	50.2	44.4	49.9	44.7	49.6	45.0	67
52.3	43.5	52.0	43.8	51.7	44.1	51.5	44.4	51.2	44.7	50.9	45.0	50.7	45.4	50.4	45.7	68
53.1	44.1	52.8	44.4	52.5	44.7	52.2	45.1	52.0	45.4	51.7	45.7	51.4	46.0	51.1	46.3	69
53.8	44.7	53.6	45.1	53.3	45.4	53.0	45.7	52.7	46.1	52.4	46.3	52.2	46.7	51.9	47.0	70
54.6	45.4	54.3	45.7	54.0	46.0	53.7	46.4	53.5	46.7	53.2	47.0	52.9	47.4	52.6	47.7	71
55.4	46.0	55.1	46.4	54.8	46.7	54.5	47.0	54.2	47.4	53.9	47.7	53.6	48.0	53.4	48.3	72
56.1	46.6	55.8	47.0	55.6	47.3	55.3	47.7	55.0	48.0	54.7	48.3	54.4	48.7	54.1	49.0	73
56.9	47.3	56.6	47.7	56.3	48.0	56.0	48.3	55.7	48.7	55.4	49.0	55.1	49.4	54.8	49.7	74
57.7	47.9	57.4	48.3	57.1	48.6	56.8	49.0	56.5	49.4	56.2	49.7	55.9	50.0	55.6	50.4	75
58.4	48.6	58.1	48.9	57.8	49.2	57.5	49.6	57.2	50.0	56.9	50.3	56.6	50.7	56.3	51.0	76
59.2	49.2	58.9	49.6	58.6	49.7	58.3	50.3	58.0	50.7	57.7	51.0	57.4	51.4	57.1	51.7	77
60.0	49.8	59.7	50.2	59.4	50.5	59.0	50.9	58.7	51.3	58.4	51.6	58.1	52.0	57.8	52.4	78
60.8	50.5	60.4	50.9	60.1	51.2	59.8	51.6	59.5	52.0	59.2	52.3	58.9	52.7	58.5	53.1	79
61.5	51.1	61.2	51.5	60.9	51.8	60.6	52.2	60.2	52.6	59.9	53.0	59.6	53.4	59.3	53.7	80
62.3	51.8	62.0	52.2	61.6	52.5	61.3	52.9	61.0	53.3	60.7	53.6	60.3	54.0	60.0	54.4	81
63.1	52.4	62.7	52.8	62.4	53.1	62.1	53.5	61.7	54.0	61.4	54.3	61.1	54.7	60.8	55.1	82
63.8	53.0	63.5	53.5	63.2	53.8	62.8	54.2	62.5	54.6	62.2	54.9	61.9	55.4	61.5	55.7	83
64.6	53.7	64.3	54.1	63.9	54.4	63.6	54.9	63.3	55.3	62.9	55.6	62.6	56.0	62.2	56.4	84
65.4	54.3	65.0	54.7	64.7	55.1	64.3	55.5	64.0	55.9	63.7	56.3	63.3	56.7	63.0	57.1	85
66.1	55.0	65.8	55.4	65.4	55.7	65.1	56.2	64.8	56.6	64.4	56.9	64.1	57.4	63.7	57.7	86
66.9	55.6	66.6	56.0	66.2	56.4	65.9	56.8	65.5	57.2	65.2	57.6	64.8	58.0	64.5	58.4	87
67.7	56.2	67.3	56.7	67.0	57.1	66.6	57.5	66.3	57.9	65.9	58.3	65.6	58.7	65.2	59.1	88
68.4	56.9	68.1	57.3	67.7	57.7	67.4	58.1	67.0	58.6	66.7	58.9	66.3	59.4	65.9	59.8	89
69.2	57.5	68.9	58.0	68.5	58.3	68.1	58.8	67.8	59.2	67.4	59.6	67.1	60.0	66.7	60.4	90
70.0	58.2	69.6	58.6	69.3	59.0	68.9	59.4	68.5	59.9	68.2	60.2	67.8	60.7	67.4	61.1	91
70.7	58.8	70.4	59.2	70.0	59.6	69.6	60.1	69.3	60.5	68.5	60.9	68.5	61.4	68.2	61.8	92
71.5	59.4	71.1	59.9	70.8	60.3	70.4	60.7	70.0	61.2	69.7	61.5	69.3	62.0	68.9	62.4	93
72.3	60.1	71.9	60.5	71.5	60.9	71.2	61.4	70.8	61.9	70.4	62.2	70.0	62.7	69.6	63.1	94
73.1	60.7	72.7	61.2	72.3	61.6	71.9	62.0	71.5	62.5	71.2	62.9	70.8	63.4	70.4	63.8	95
73.8	61.3	73.4	61.8	73.1	62.2	72.7	62.7	72.3	63.2	71.9	63.6	71.5	64.0	71.1	64.5	96
74.5	62.0	74.2	62.5	73.8	62.9	73.4	63.3	73.0	63.8	72.7	64.2	72.3	64.7	71.9	65.1	97
75.4	62.6	75.0	63.1	74.6	63.5	74.2	64.0	73.8	64.5	73.4	64.9	73.0	65.4	72.6	65.8	98
76.1	63.3	75.7	63.8	75.3	64.2	74.9	64.6	74.6	65.1	74.2	65.5	73.8	66.0	73.4	66.5	99
76.9	63.9	76.5	64.4	76.1	64.8	75.7	65.3	75.3	65.8	74.9	66.2	74.5	66.7	74.1	67.2	100
Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Dep	Lat	Distance
50d 16m		49d 55m		49d 34m		49d 13m		48d 52m		48d 31m		48d 10m		47d 49m		
Qu. 120		Qu. 118		Qu. 117		Qu. 116		Qu. 114		Qu. 113		Qu. 111		Qu. 110		

Distanc	Qu. 91		Qu. 92		Qu. 94		Qu. 95		Qu. 96		Qu. 97		Qu. 99		Qu. 100	
	42d 32m		42d 53m		43d 15m		43d 36m		43d 57m		44d 18m		44d 39m		45d 00m	
	Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*
1	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7	00.7
2	01.5	01.4	01.5	01.4	01.5	01.4	01.4	01.4	01.4	01.4	01.4	01.4	01.4	01.4	01.4	01.4
3	02.2	02.0	02.2	02.0	02.2	02.1	02.2	02.1	02.2	02.1	02.1	02.1	02.1	02.1	02.1	02.1
4	02.9	02.7	02.9	02.7	02.9	02.7	02.9	02.8	02.9	02.8	02.9	02.8	02.5	02.8	02.8	02.8
5	03.7	03.4	03.7	03.4	03.6	03.4	03.6	03.5	03.6	03.5	03.6	03.5	03.6	03.5	03.5	03.5
6	04.4	04.1	04.4	04.1	04.4	04.1	04.3	04.1	04.3	04.2	04.3	04.2	04.3	04.2	04.2	04.2
7	05.2	04.7	05.1	04.8	05.1	04.8	05.1	04.8	05.0	04.9	05.0	04.9	05.0	04.9	04.9	04.9
8	05.9	05.4	05.9	05.4	05.8	05.5	05.8	05.5	05.8	05.6	05.7	05.6	05.7	05.6	05.7	05.7
9	06.6	06.1	06.6	06.1	06.6	06.2	06.5	06.2	06.5	06.2	06.4	06.3	06.4	06.3	06.4	06.4
10	07.4	06.8	07.3	06.8	07.3	06.9	07.2	06.9	07.2	06.9	07.2	07.0	07.1	07.0	07.1	07.1
11	08.1	07.4	08.1	07.5	08.0	07.5	08.0	07.6	07.9	07.6	07.9	07.7	07.8	07.7	07.8	07.8
12	08.8	08.1	08.8	08.2	08.7	08.2	08.7	08.3	08.6	08.3	08.6	08.4	08.5	08.4	08.5	08.5
13	09.6	08.8	09.5	08.8	09.5	08.9	09.4	09.0	09.4	09.0	09.3	09.1	09.2	09.1	09.2	09.2
14	10.3	09.5	10.2	09.5	10.2	09.6	10.1	09.7	10.1	09.7	10.0	09.8	10.0	09.8	09.9	09.9
15	11.1	10.1	11.0	10.2	10.9	10.3	10.9	10.4	10.8	10.4	10.7	10.5	10.7	10.5	10.6	10.6
16	11.8	10.8	11.7	10.9	11.6	11.0	11.6	11.0	11.5	11.1	11.5	11.2	11.4	11.2	11.3	11.3
17	12.5	11.5	12.4	11.6	12.4	11.6	12.3	11.7	12.2	11.8	12.2	11.9	12.1	12.0	12.0	12.0
18	13.3	12.2	13.2	12.2	13.1	12.3	13.0	12.4	13.0	12.5	12.9	12.6	12.8	12.7	12.7	12.7
19	14.0	12.8	13.9	12.9	13.8	13.0	13.8	13.1	13.7	13.2	13.6	13.3	13.5	13.4	13.4	13.4
20	14.7	13.5	14.6	13.6	14.6	13.7	14.5	13.8	14.4	13.9	14.3	14.0	14.2	14.1	14.1	14.1
21	15.5	14.2	15.4	14.3	15.3	14.4	15.2	14.5	15.1	14.6	15.0	14.7	14.9	14.8	14.8	14.8
22	16.2	14.9	16.1	15.0	16.0	15.1	15.9	15.2	15.8	15.3	15.8	15.4	15.6	15.5	15.5	15.5
23	17.0	15.5	16.8	15.6	16.7	15.8	16.7	15.9	16.6	16.0	16.5	16.1	16.4	16.2	16.3	16.3
24	17.7	16.2	17.6	16.3	17.5	16.4	17.4	16.6	17.3	16.7	17.2	16.8	17.1	16.9	17.0	17.0
25	18.4	16.9	18.3	17.0	18.2	17.1	18.1	17.3	18.0	17.4	17.9	17.5	17.8	17.6	17.7	17.7
26	19.2	17.6	19.0	17.7	18.9	17.8	18.8	17.9	18.7	18.0	18.6	18.1	18.5	18.3	18.4	18.4
27	19.9	18.3	19.8	18.4	19.7	18.5	19.5	18.6	19.4	18.7	19.3	18.8	19.2	19.0	19.1	19.1
28	20.6	18.9	20.5	19.0	20.4	19.2	20.3	19.3	20.2	19.4	20.0	19.5	19.9	19.7	19.8	19.8
29	21.4	19.6	21.2	19.7	21.1	19.9	21.0	20.0	20.5	20.1	20.8	20.2	20.6	20.4	20.5	20.5
30	22.1	20.3	22.0	20.4	21.8	20.6	21.7	20.7	21.6	20.8	21.5	20.9	21.3	21.1	21.2	21.2
31	22.8	21.0	22.7	21.1	22.6	21.2	22.4	21.4	22.3	21.5	22.2	21.6	22.0	21.8	21.9	21.9
32	23.6	21.6	23.4	21.8	23.3	21.9	23.2	22.1	23.0	22.2	22.9	22.3	22.8	22.5	22.6	22.6
33	24.3	22.3	24.2	22.5	24.0	22.6	23.9	22.8	23.8	22.9	23.6	23.0	23.5	23.2	23.3	23.3
34	25.1	23.0	24.9	23.1	24.8	23.3	24.6	23.5	24.5	23.6	24.3	23.7	24.2	23.9	24.0	24.0
35	25.8	23.7	25.6	23.8	25.5	24.0	25.3	24.2	25.2	24.3	25.1	24.4	24.9	24.6	24.7	24.7
36	26.5	24.3	26.4	24.5	26.2	24.7	26.1	24.8	25.9	25.0	25.8	25.1	25.6	25.3	25.4	25.4
37	27.3	25.0	27.1	25.2	26.9	25.3	26.8	25.5	26.6	25.7	26.5	25.8	26.3	26.0	26.1	26.1
38	28.0	25.7	27.8	25.8	27.7	26.0	27.5	26.2	27.4	26.4	27.2	26.5	27.0	26.7	26.9	26.9
39	28.7	26.4	28.5	26.5	28.4	26.7	28.2	26.9	28.1	27.1	27.9	27.2	27.7	27.4	27.6	27.6
40	29.5	27.0	29.3	27.2	29.1	27.4	29.0	27.6	28.8	27.8	28.6	27.9	28.4	28.1	28.3	28.3
41	30.2	27.7	30.0	27.9	29.8	28.1	29.7	28.3	29.5	28.5	29.4	28.6	29.2	28.8	29.0	29.0
42	31.0	28.4	30.7	28.6	30.6	28.8	30.4	29.0	30.2	29.1	30.1	29.3	29.9	29.5	29.7	29.7
43	31.7	29.1	31.5	29.2	31.3	29.5	31.1	29.7	31.0	29.8	30.8	30.0	30.6	30.2	30.4	30.4
44	32.4	29.7	32.2	29.9	32.0	30.1	31.9	30.4	31.7	30.5	31.5	30.7	31.3	30.9	31.1	31.1
45	33.2	30.4	32.9	30.6	32.8	30.8	32.6	31.1	32.4	31.2	32.2	31.4	32.0	31.6	31.8	31.8
46	33.9	31.1	33.7	31.3	33.5	31.5	33.3	31.7	33.1	31.9	32.9	32.1	32.7	32.3	32.5	32.5
47	34.6	31.8	34.4	32.0	34.2	32.2	34.0	32.4	33.8	32.6	33.7	32.8	33.4	33.0	33.2	33.2
48	35.4	32.4	35.1	32.6	34.9	32.9	34.8	33.1	34.6	33.3	34.4	33.5	34.1	33.7	33.9	33.9
49	36.1	33.1	35.9	33.3	35.7	33.6	35.5	33.8	35.3	34.0	35.1	34.2	34.8	34.4	34.6	34.6
50	36.9	33.8	36.6	34.0	36.4	34.3	36.2	34.5	36.0	34.7	35.8	34.9	35.6	35.2	35.3	35.3
	Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*
	47d 28m		47d 07m		46d 45m		46d 24m		46d 03m		45d 42m		45d 21m		45d 00m	
Distance	Qu. 109		Qu. 108		Qu. 106		Qu. 105		Qu. 104		Qu. 103		Qu. 101		Qu. 100	

Qu. 91		Qu. 92		Qu. 94		Qu 95		Qu. 96		Qu. 97		Qu. 99		Qu. 100		Distance.
42d 32m		42d 53m		43d 15m		43d 36m		43d 57m		44d 18m		44d 39m		45d 00m		
Lat	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	
37.6	34.5	37.3	34.7	37.1	34.9	36.9	35.2	36.7	35.4	36.5	35.6	36.3	35.9	36.1	36.1	51
38.3	35.2	38.1	35.4	37.9	35.6	37.6	35.9	37.4	36.1	37.2	36.3	37.0	36.6	36.8	36.8	52
39.1	35.8	38.8	36.0	38.6	36.3	38.4	36.6	38.2	36.8	37.9	37.0	37.7	37.3	37.5	37.5	53
39.8	36.5	39.5	36.7	39.3	37.0	39.1	37.3	38.9	37.5	38.7	37.7	38.4	38.0	38.2	38.2	54
40.5	37.2	40.3	37.4	40.0	37.7	39.8	38.0	39.6	38.2	39.4	38.4	39.1	38.7	38.9	38.9	55
41.3	37.9	41.0	38.1	40.8	38.4	40.4	38.6	40.3	38.9	40.1	39.1	39.2	39.4	39.6	39.6	56
42.0	38.5	41.7	38.8	41.5	39.0	41.3	39.3	41.0	39.6	40.8	39.8	40.5	40.1	40.3	40.3	57
42.7	39.2	42.5	39.4	42.2	39.7	42.0	40.0	41.8	40.3	41.5	40.5	41.2	40.8	41.0	41.0	58
43.5	39.9	43.2	40.1	43.0	40.4	42.7	40.7	42.5	40.9	42.2	41.2	41.9	41.5	41.7	41.7	59
44.2	40.6	43.9	40.8	43.7	41.1	43.4	41.4	43.2	41.6	43.0	41.9	42.7	42.2	42.4	42.4	60
45.0	41.2	44.7	41.5	44.4	41.8	44.2	42.1	43.9	42.3	43.7	42.6	43.4	42.9	43.1	43.1	61
45.7	41.9	45.4	42.2	45.1	42.5	44.9	42.8	44.6	43.0	44.4	43.3	44.1	43.6	43.8	43.8	62
46.4	42.6	46.1	42.8	45.9	43.2	45.6	43.5	45.4	43.7	45.1	44.0	44.8	44.3	44.5	44.5	63
47.2	43.3	46.8	43.5	46.6	43.8	46.3	44.2	46.1	44.1	45.8	44.7	45.5	45.0	45.3	45.3	64
47.9	43.9	47.6	44.2	47.3	44.5	47.1	44.9	46.8	45.1	46.5	45.4	46.2	45.7	46.0	46.0	65
48.6	44.6	48.3	44.9	48.0	45.2	47.8	45.5	47.5	45.8	47.3	46.1	46.9	46.4	46.7	46.7	66
49.4	45.3	49.0	45.6	48.8	45.9	48.5	46.2	48.2	46.5	48.0	46.8	47.6	47.1	47.4	47.4	67
50.1	46.0	49.8	46.2	49.5	46.6	49.2	46.9	49.0	47.2	48.7	47.5	48.3	47.8	48.1	48.1	68
50.9	46.6	50.5	46.9	50.2	47.3	50.0	47.6	49.7	47.9	49.4	48.2	49.1	48.5	48.8	48.8	69
51.6	47.3	51.2	47.6	51.0	48.0	50.7	48.3	50.4	48.6	50.1	48.9	49.8	49.2	49.5	49.5	70
52.3	48.0	52.0	48.3	51.7	48.6	51.4	49.0	51.1	49.3	50.8	49.6	50.5	49.9	50.2	50.2	71
53.1	48.7	52.7	49.0	52.4	49.3	52.1	49.7	51.8	50.0	51.6	50.3	51.2	50.6	50.9	50.9	72
53.8	49.3	53.4	49.6	53.1	50.0	52.9	50.4	52.6	50.7	52.3	51.0	51.9	51.3	51.6	51.6	73
54.5	50.0	54.2	50.3	53.9	50.7	53.6	51.1	53.3	51.4	53.0	51.7	52.6	52.0	52.3	52.3	74
55.3	50.7	54.9	51.0	54.6	51.4	54.2	51.8	54.0	52.1	53.7	52.4	53.3	52.8	53.0	53.0	75
56.0	51.4	55.6	51.7	55.3	52.1	55.0	52.4	54.7	52.7	54.4	53.0	54.0	53.4	53.7	53.7	76
56.8	52.1	56.4	52.4	56.1	52.7	55.7	53.1	55.4	53.4	55.1	53.7	54.7	54.1	54.4	54.4	77
57.5	52.7	57.1	53.0	56.8	53.4	56.5	53.8	56.2	54.1	55.8	54.4	55.5	54.8	55.2	55.2	78
58.2	53.4	57.8	53.7	57.5	54.1	57.2	54.5	56.9	54.8	56.6	55.1	56.2	55.5	55.9	55.9	79
59.0	54.1	58.6	54.4	58.2	54.8	57.9	55.2	57.6	55.5	57.3	55.8	56.9	56.2	56.6	56.6	80
59.7	54.8	59.3	55.1	59.0	55.5	58.5	55.9	58.3	56.2	58.0	56.5	57.6	56.9	57.3	57.3	81
60.4	55.4	60.0	55.8	59.7	56.2	59.4	56.6	59.0	56.9	58.7	57.2	58.3	57.6	58.0	58.0	82
61.2	56.1	60.8	56.4	60.4	56.9	60.1	57.3	59.8	57.6	59.4	57.9	59.0	58.4	58.7	58.7	83
61.9	56.8	61.5	57.1	61.2	57.5	60.8	58.0	60.5	58.3	60.1	53.6	59.7	59.1	59.4	59.4	84
62.6	57.5	62.2	57.8	61.9	58.2	61.5	58.7	61.2	59.0	60.9	59.3	60.4	59.8	60.1	60.1	85
63.4	58.1	63.0	58.5	62.6	58.9	62.3	59.3	61.9	59.7	61.6	60.0	61.1	60.5	60.8	60.8	86
64.1	58.8	63.7	59.2	63.3	59.6	63.0	60.0	62.6	60.4	62.3	60.7	61.9	61.2	61.5	61.5	87
64.9	59.5	64.4	59.8	64.1	60.3	63.7	60.7	63.4	61.1	63.0	51.4	62.6	61.9	62.2	62.2	88
65.6	60.2	65.1	60.5	64.8	61.0	64.4	61.4	64.1	61.8	63.7	52.1	63.3	62.6	62.9	62.9	89
66.3	60.8	65.9	61.2	65.5	61.7	65.2	62.1	64.8	62.5	64.1	62.8	64.0	63.3	63.6	63.6	90
67.1	61.5	66.6	61.9	66.2	62.3	65.9	62.8	65.5	63.2	65.2	63.5	64.7	64.0	64.3	64.3	91
67.8	62.2	67.3	62.6	67.0	63.0	66.6	63.5	66.2	63.8	65.9	64.2	65.4	64.7	65.0	65.0	92
68.5	62.9	68.1	63.2	67.7	63.7	67.3	64.2	67.0	64.5	66.6	64.9	66.1	65.4	65.8	55.8	93
69.3	63.5	68.8	63.9	68.4	64.4	68.1	64.9	67.7	65.2	67.3	65.6	66.8	66.1	66.5	66.5	94
70.0	64.2	69.5	64.6	69.2	65.1	68.8	65.6	68.4	65.9	68.0	66.3	67.5	66.8	67.2	67.2	95
70.8	64.9	70.3	65.3	69.9	65.8	69.5	66.2	69.1	66.6	68.7	67.0	68.3	67.5	67.9	67.9	96
71.5	65.6	71.0	66.0	70.6	66.4	70.2	66.9	69.8	67.3	69.5	67.7	69.0	68.2	68.6	63.6	97
72.2	66.2	71.7	66.6	71.3	67.1	71.0	67.6	70.6	68.0	70.2	68.4	69.7	68.9	69.3	69.3	98
73.0	66.9	72.5	67.3	72.1	67.8	71.7	68.3	71.3	68.7	70.9	69.1	70.4	69.6	70.0	70.0	99
73.7	67.6	73.2	68.0	72.8	68.5	72.4	69.0	72.0	69.1	71.6	69.8	71.1	70.3	70.7	70.7	100
Dep	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	*Dep*	*Lat*	Distance
47d 28m		47d 07m		46d 45m		46d 24m		46d 03m		45d 42m		45d 21m		45d 00m		
Qu. 109		Qu. 108		Qu. 106		Qu. 105		Qu. 104		Qu. 102		Qu. 101		Qu. 10		

4 Pts.

The Explanation of the TRAVERSE-TABLE.

IN the Left-hand Column of the Left-hand Pages you have the Diſtance run from 1 to 50, and in the Right-hand Column of the Right-hand Pages you have the Diſtance run from 51 to 100, and will readily ſerve for any Diſtance under 1000, which may be either Miles or Leagues, as is uſual in *Navigation.*

In the Right-hand Column of the Left-hand Pages, and in the Column next the Diſtance run in the Right-hand Pages, you have at the Head of the Tables, every Quarter Point of the *Compaſs*, increaſing gradually and equally, from ¼ of a Point to 4 Points, in a direct Order. And at the Foot of the Tables in the ſame Columns, you have the ¼ Points of the *Compaſs*, increaſing gradually by ¼ Point in a Retrograde Order, from 4 Points in the laſt Table, to 7¾ Points in the firſt Table: In all which Columns you may obſerve, that the Sum of the Points at the Head and Foot of the Tables are equal to 8 Points, which is ¼ of the *Compaſs.*

Under the Points at the Head of the Table you have a Line of Quotients, beginning with 1, and ending with 100, with the Signs —, +, annext to ſome of them, which Signs are to ſhew that the true Quotient is ſomething more, or leſs, than is there aſſerted. The Sign — ſignifies the true Quotient is ſomewhat leſs than the Number the Sign is join'd to. The Sign + ſignifies the Quotient is ſomewhat more than the Number annext to it. The Uſe of which will be ſhew'd in the *ſecond Problem.* At the Foot of the Tables over the Points there is a Line alſo of Quotients, beginning at 100 in the laſt Table, and increaſes unequally to 16650, without any Sign, becauſe there is a conſiderable Difference between them, and therefore, the Quotient there ſet down is the neareſt true Quotient in whole Numbers.

Under this Line of Quotients at the Head, and over it at the Foot of the Tables, you have a Line of Degrees and Minutes, beginning at the Head with 21 Minutes, and increaſing gradually therewith to 4 Points, or 45 Degrees, in a direct Order. But at the Foot of the Tables they begin at 45 Degrees in the laſt Table, increaſe by the ſame 21 Minutes, in a Retrograde Order, to 89 Degrees 39 Minutes; in which you may obſerve that the Degrees and Minutes at the Head of the Tables, added to thoſe at the Foot, the Sum is always 90 Degrees, or a Quarter of a Circle.

Under theſe Degrees and Minutes at the Head, but over them at the Foot, is a Line of *Lat.* and *Dep.* which ſignifies the Difference of Latitude and Departure. That is, when the Courſe is at the Head of the Table, the Difference of Latitude is found under *Lat.* and the Departure is found under *Dep.* belonging to that Courſe. But when the Courſe is at the Foot of the Table, the Difference of Latitude is found over *Lat.* and the Departure is found over *Dep.* belonging to the ſaid Courſe. In all which Tables you may obſerve, That when the Courſe is at the Head of the Tables, or leſs than 4 Points, the Difference of Latitude is greater than the Departure. And when the Courſe is found at the Foot of the Tables, or greater than 4 Points, the Difference of Latitude is leſs than the Departure.

This Table will readily ſolve all the Parts of the *Mathematicks*, that are performed by *Plain* and *Spherical Trigonometry*; though in this Treatiſe, I ſhall only apply it to the Solving of all the Problems of *Navigation*, and the *Aſtronomy* that is Practical at Sea. Before which, you muſt know,

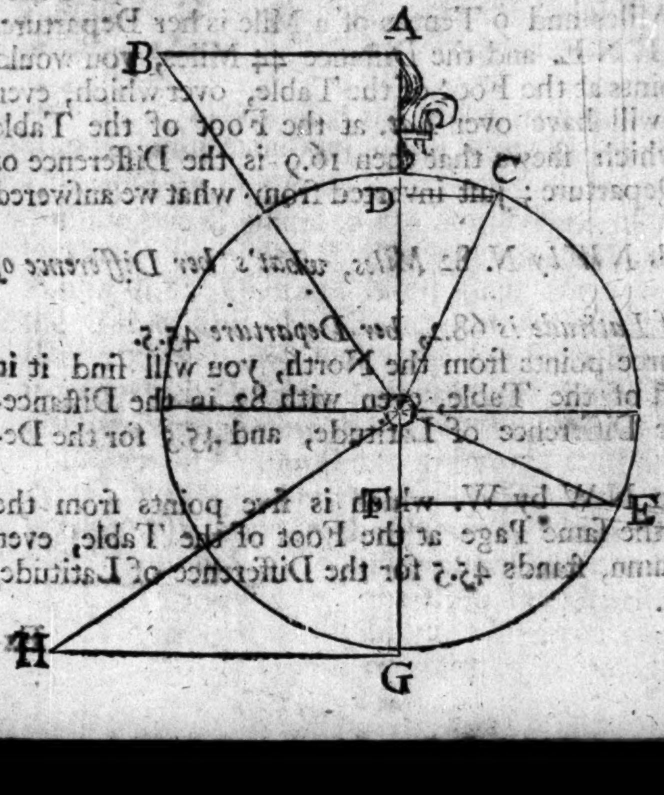
The Courſe is the Point of the *Compaſs* the Ship hath made her Way good on in any propoſed Time.

The Diſtance run, is the Number of Miles the Ship hath ſailed on any direct Courſe in any Time.

The Difference of Latitude, is how many Miles directly North, or South, the Ship hath made in ſailing any direct Courſe and Diſtance.

The Departure, is how many Miles directly Eaſt, or Weſt, the Ship hath made by ſailing the ſaid Courſe and Diſtance.

Therefore, If the Courſe is directly North, or South, the Diſtance run is the Difference of Latitude; and if it is directly Eaſt, or Weſt, the Diſtance run is the Departure, and then we have no Occaſion for this *Traverſe Table*; But if ſhe ſails any Diſtance on any other of the intermediate Points of the *Compaſs*, we muſt then have Recourſe to this Table, to know how many Miles directly North, or South, and how many Miles directly Eaſt or Weſt, would have brought the Ship to the ſame Place, as by this Figure is evident.



Suppoſe a Ship from O, ſhould ſail directly *N.N.E.* to *C*, its plain, if ſhe had from *O* ſailed directly N. to *D*, then from *D* ſailed directly Eaſt to *C*, ſhe would have been in the ſame Place *(C)* that is, ſhe hath alter'd her Latitude by the Line *O D*, and therefore *O D* is her Difference of Latiude, and *DC* is her Departure.

Again, ſuppoſe a Ship from *O*, ſhould ſail *N. W.* by *N.* to *B*, its certain, ſhe would have been in the ſame Place *B*, had ſhe from *O* ſail'd North to *A*, and from

A

A ſail'd Weſt to *B*, where *O A* is her Difference of Latitude, and *AB* is her Departure.

Again, ſuppoſe from O a Ship ſhould ſail E. S.E. to E. it's evident from what has been ſaid, that O F is her Difference of Latitude South, and FE is her Departure Eaſt.

And laſtly, ſuppoſe from O ſhe had ſailed S W by W. to H, it's clear that H is to the Southward of O, by the Line O G; and to the Weſtward of O by the Line H G; and therefore O G is her South Difference of Latitude, and GH is her Weſt Departure. The true Quantity of which is found by this *Traverſe-Table*, for any propoſed Courſe and Diſtance, as is the Subject of the following *Problem.*

PROBLEM I.

The Courſe and Diſtance run given, to find the Difference of Latitude and Departure.

Rule. Find the Courſe at the Head or Foot of the *Traverſe Table*, and the Diſtance Run in the Diſtance Column: In the common Angle (that is) directly over, or under the Courſe, and even with the Diſtance, ſtands the required Difference of Latitude and Departure.

Example 1. *A Ship ſails N N E. 44 Miles, what is her Difference of Latitude and Departure?*

Anſwer, *Her Difference of Latitude is 40.6, her Departure* 16.9.

For N N E. being two Points from the North, you muſt find two Points at the Head of the Table, *viz.* in Page 20. under which, and even with the Diſtance 44 in the Left-hand Column, ſtands under *Lat.* 40.6, and under *Dep.* 16.9, which ſhews that 40 Miles and 6 Tenths of a Mile is her Difference of Latitude; and 16 Miles and 9 Tenths of a Mile is her Departure.

But had the Courſe been E N E. and the Diſtance 44 Miles, you would in the ſame Page find ſix Points at the Foot of the Table, over which, even with the Diſtance 44, you will have over *Lat.* at the Foot of the Table 16.9, and over *Dep.* 40.6, which ſhews that then 16.9 is the Difference of Latitude, and 40.6 is her Departure; juſt inverted from what we anſwered in the firſt *Example.*

Example 2. *A Ship ſails NW by N. 82 Miles, what's her Difference of Latitude and Departure?*

Anſwer, *Her Difference of Latitude is* 68.2, *her Departure* 45.5.

Becauſe N W by N. is three points from the North, you will find it in the 29th Page, at the Head of the Table, even with 82 in the Diſtance-Column, ſtands 68.2 for the Difference of Latitude, and 45.5 for the Departure.

But had her Courſe been N W by W. which is five points from the North, you will find it in the ſame Page at the Foot of the Table, even with 82 in the Diſtance-Column, ſtands 45.5 for the Difference of Latitude, and 68.2 for the Departure.

Example 3. *Suppoſe a Ship ſhould ſail* S S E. *half* E. *Diſtance* 120 *Miles, what is her Difference of Latitude and Departure?*

Anſwer, *Her Difference of Latitude is* 106 *Miles, her Departure* 56 *Miles.*

For find 2½ Points at the Head of the Table, and when the Diſtance exceeds 100, and ends with a Cypher, find only the two firſt Figures of the Diſtance Run in the Diſtance-Column, leave out the Decimal point of the Numbers anſwering thereto, and you have the Difference of Latitude and Departure anſwering to the whole Diſtance Run.

Example 4. *If a Ship ſhould ſail* S W *by* S. ¼ W. 154 *Miles, what is her Difference of Latitude and Departure.*

Anſwer. *Her Differrnce of Latitude is* 123.2, *and her Departure* 91.4.

For 3¼ Points gives for 150 Miles Diſtance, 120 Difference of Latitude, and 89 Departure, and in the ſame Columns there is for 4 Miles Diſtance 3.2 Diff. Lat. and 2.4 Dep.

Therefore, for the whole Diſtance 154 we have 123.2 Difference of Latitude, and 91.4 Departure.

Had this laſt *Example* been S. W. ¾ W. Diſtance 154 Miles, we ſhould have had theſe Numbers in the ſame Places, only the Courſe would be found at the Bottom of the Table, and 91.4 would be the Difference of Latitude, 123.2 the Departure.

PROBLEM II.

The Difference of Latitude and Departure given; to find the Courſe and Diſtance Run.

This *Problem* being the Reverſe of the firſt, may readily be ſolv'd by thoſe who underſtand that; but becauſe I have often met with ſome who could not readily find the Difference of Latitude and Departure, even when they have been ſhew'd them in their proper Columns; nor tell whether the Courſe was at the Head or Foot of the Table, I have (for their Eaſe) placed Quotients at the Head and Foot of the Table, and for their Uſe preſcribe this *Rule.*

Place two Cyphers to the Right-hand of the Departure, then divide it by the Difference of Latitude, without taking any Notice of the Decimal Points, if the Quotient is leſs than 100, you will find it at the Head of the Table, and the Courſe next under it; but if the Quotient be greater than 100, you will find it at the Foot thereof, and the Courſe juſt over it; in which Columns you have the given Difference of Latitude and Departure, even therewith, and in the Diſtance Column is the Diſtance Run.

Example 1. Suppoſe a Ship ſails till the Difference of Latitude be 40.7 M. North, her Departure 19.2 Miles Eaſt, what is her Courſe and Diſtance Run?

40.7)19.200(47 the Quotient, which found at the Head of the Table,
1628 ſhews her Courſe to be 2¼ Points, or 25 deg. 19 min.
2920 therefore her Courſe is N. N. E. ¼ E. Diſtance 45
2849 Miles, which you may find in the Diſtance Column,
71 oppoſite to 40.7 and 19.2

Example 2. A Ship ſails between the North and Weſt, till her Difference of Latitude is 74.1 Miles, her Departure 39.6 Miles; What's her Courſe and Diſtance Run?

74.1)39.600(53 the Quotient; therefore her Courſe is 2½ Points, or
3705 28 deg. 7 min. which is N. N. W. ½ W. Diſtance
2550 84 Miles, as you will find in the 25*th* Page.
2223 *Note*, If there is only one Dot between any Figures,
327 it ſhews they are Miles and Tenths of a Mile; but
when there is two Dots between them, they are Degrees and Minutes.

Example 3. Suppoſe a Ship ſails till the Difference of Latitude is 18.5M. South, her Departure 30.9 Miles Eaſt, what is her Courſe and Diſtance Run?

18.5)30.900(167 the Quotient, the neareſt to which you will find 166
1240 at the Foot of the Table, and therefore her
1300 Courſe is 5¼ Points, which is S. E. by E. ¼ E.
5 Diſtance 36 Miles.

Example 4. Let a Ship ſail between the South and Weſt, till her Difference of Latitude is 145 Miles, her Departure 98 Miles; what is her Courſe and Diſtance Run?

145)9800(67 the Quotient, which you will find at the Head of the
1100 30*th* Page, and her Courſe to be South 34 deg.
85 6 min. Weſt, Diſtance 175 Miles: For although
you cannot at once find under the *Quo.* 145 and 98, yet the neareſt leſs Number to 145 is 141, which gives 170 Diſtance; and the remaining 4 of the Difference of Latitude, gives 5 for the Diſtance; therefore the whole Diſtance is 175 Miles.

PROBLEM III. CASE I.

Various Courſes and Diſtances given; to reduce them into one Courſe and Diſtance, which is called working a Traverſe.

Rule. Place the given Courſes and Diſtances in a Column directly under each other; even with which, make 4 more Columns, *viz.* one for the Northing, another for the Southing; one for the Eaſting, and another for the Weſting. Then by *Prob.* 1. find the Difference of Latitude and Departure, for each Courſe and Diſtance; obſerving if the Courſe be Northerly, to put the Difference of Latitude in the North Column. If it be Southerly ſet it in the South Column; if the Courſe is Eaſterly place the Departure in the Eaſt Column; but if it be Weſterly, ſet it in the Weſt. Gather into one Sum, all the Numbers in the North Column, do the ſame by the South, Eaſt and Weſt Columns. Now the Difference between the North and South Columns is the Difference of Latitude, which is of the ſame Denomination with the greater of them; the Difference between the Eaſt and Weſt Columns, is the Departure; which is likewiſe of the ſame Denomination as the greater Number of them, with this Difference of Latitude and Departure laſt found, find the Courſe and Diſtance Run, by *Prob.* 2.

Example. A Ship in 24 Hours ſails N by E. 24 Miles, NE. 15 Miles, E by N. 7 Miles, S E by S. 10 Miles, S S W. 4 Miles, N. N. W. half W. 5 Miles, what is her true Courſe, Diſtance, Difference of Latitude and Departure?

The Operation.

Courſes and Diſtances.	Differ. Latitude.		Departure	
	N.	S.	E.	W.
N. by E. 24	23.5		4.7	
N. E. 15	10.6		10.6	
E. by N. 7	1.4		6.8	
S. E. by S. 10		8.3	5.6	
S S W. 4		3.7		1.5
N.N. W. ½ W. 5	4.4			2.4
Sum	39.9	12.0	27.7	3.9
	12.0		3.9	
Diff. Latitude	27.9		23.8	Depar.

Her true Courſe is N. 40 deg. 26 min. E. Diſtance 36 Miles.

Solution.

In this Table you ſee the Difference of Latitude and Departure, in the reſpective Columns peculiar to each given Courſe and Diſtance; the Sum of which is, that in the 24 Hours the Ship hath ſailed directly North 39.9 Miles South, 12.00 Eaſt, 27.7 Eaſt, and Weſt 3.9 Miles. But if ſhe ſail 39.9 Miles North, then 12.00 Miles S. it is plain by Subtraction, ſhe hath only gotten 27.9 Miles to the Northward, which is her true Difference of Latitude. And if ſhe ſail 27.7 Miles Eaſt, then 3.9 Miles Weſt, it is clear ſhe hath only got 23.8 Miles to the Eaſtward, which is her true Departure; therefore by *Prob.* 2. her true Couſe is North 40 deg. 26 min. Eaſt, Diſtance 36 Miles, from the Place ſhe firſt ſailed from.

We need not illuſtrate this *Caſe* with any more *Examples*, it will be ſufficiently explained in the following *Caſes* of this *Problem*, and by a Compaſs which hath Variation, is the Subject of

PROBLEM III. CASE II.

Various Courſes and Diſtances, with the Variation of the Compaſs given; to find the Ships true Courſe, Diſtance, Difference of Latitude and Departure.

Rule. Reduce the given Courſes and Diſtances, into one Courſe and Diſtance, without taking any Notice of the Variation, by *Prob.* 3, *Caſe* 1. then add, or take from this Courſe the Quantity of the Variation; or from the Quantity of the Variation ſubtract this Courſe, you will have the Ships true Courſe, with which and the Diſtance before found, you will find the true Difference of Latitude and Departure, by *Prob.* 1.

Example A Ship at Sea, in 24 Hours ſails E. by S. 7 Miles, N E. by E. 12 Miles, N N E. half E. 14 Miles, N N W. 12 Miles, N W. half W. 15 Miles by a Compaſs that varies 9 deg. 30 min. Eaſt: What is her true Courſe, Diſtance, Difference of Latitude and Departure?

The Operation.

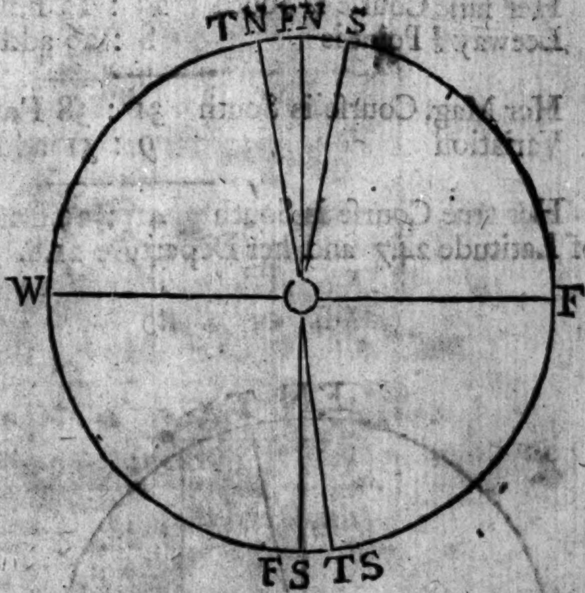
Courſes and Diſtances.	*Differ. Latitude.*		*Departure.*	
	N.	S.	E.	W.
E by S. 7		1.4	6.8	
N. E. by E. 12	6.7		10.0	
NNE. half E. 14	12.3		6.6	
NNW. 12	11.1			4.6
NW. half W. 15	7.1			13.2
Sum	37.2	1.4	23.4	17.8
	1.4		17.8	
Falſe Diff. Lat.	35.8		5.6. falſe Dep.	

Her falſe Courſe is North 8 : 47 Eaſt, Diſtance 36 Miles.
Variation 9 : 30 Eaſt, add

Her true Courſe is N. 18 : 17 E. Diſtance 36 Miles, her true Difference of Latitude is 34.2 Departure 11.3.

Solution.

By the Sum of the Operation, you ſee ſhe hath made by the Compaſs 37.2 Miles North, 1.4 Miles South, 23.4 Miles Eaſt, and 17.8 Miles Weſt; and by Subtraction of the oppoſite Points, ſhe hath made 35.8 Miles North, and 5.6 Miles Eaſt; therefore, by *Prob.* 2. her falſe Courſe is North 8 deg. 47 min. Eaſt, Diſtance 36 Miles, which Courſe you muſt now correct by the Varition. Thus, in the Figure, let F N repreſent the falſe North, and T N the true North; the Difference between which is always the Variation, E is the falſe Eaſt, and W the falſe Weſt: Now the falſe Courſe muſt always be ſet off from FN or FS, towards E or W, which in this *Example* will be at S, the Place of the Ship, and OS is the Line the Ship hath made her Way good on; and now the true Courſe is always the Arch of the Compaſs contained between TN and S, or TS and S, *viz.* to which S is neareſt, and in this *Example* is TN; therefore, TN,S is the true Courſe, which with the Variation 9 deg. 30 min. added to the falſe Courſe 8 deg. 47 min. is 18 deg. 17 min. the true Courſe as above.



PROBLEM III. CASE III.

Various Courſes and Diſtances, with the Quantity of the Leeway, and Variation of the Compaſs given; to find the true Courſe, Diſtance, Difference of Latitude and Departure.

Rule. Reduce the given Courſes and Diſtances into one Courſe and Diſtance, by *Prob.* 3, *Caſe* 1. without taking any Notice of the Leeway and Variation, correct this Courſe by the Leeway, which call the Magnetick Courſe; correct the Magnetick Courſe by the Variation, you have the true Courſe; with which, and the Diſtance before found, you muſt find her true Difference of Latitude and Departure, by *Prob.* 1.

Example 1. A Ship in 24 Hours, with her Starboard Tacks on board, ſails ENE. 10 Miles, E by S. 12 Miles, SE by S. 14 Miles, S by W. 9 Miles, S. W. half W. 18 Miles, Leeway upon each Courſe ¾ Point, by a Compaſs that varies 9 deg. 51 min. Weſt; what is her true Courſe, Diſtance, Difference of Latitude and Departure for the whole Time?

The Operation.

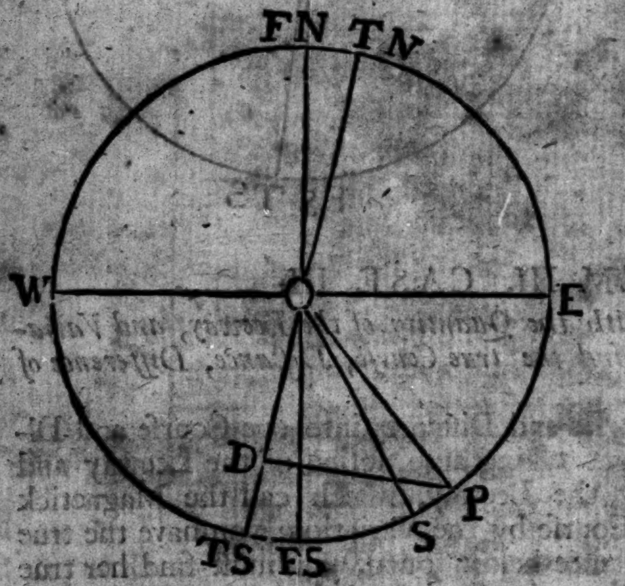
Courſes and Diſtances.	*Differ. Latitude.*		*Departure.*	
	N.	S.	E.	W.
ENE. 10	3.8		9.2	
E by S. 12		2.3	11.8	
SE by S. 14		11.6	7.8	
S by W. 9		8.8		1.8
S W half W. 18		11.4		13.9
	3.8	34.1	28.8	15.7
		3.8	15.7	
Falſe Diff. Lat.		30.3	13.1 falſe Dep.	

Her falſe Courſe is South 23 : 12 Eaſt, Diſtance 33 Miles
Leeway ¾ Point is 8 : 26 add

Her Mag. Courſe is South 31 : 38 Eaſt, Diſtance 33 Miles
Variation 9 : 51 add Weſt,

Her true Courſe is South 41 : 29 Eaſt, Diſtance 33 Miles her Difference of Latitude 24.7 and her Departure 21.8.

Solution.



By the Operation her falſe Courſe is S. 23 deg. 12 min. E. Diſtance 33 Miles. Now in the Figure, FS is the falſe South, and OS is the Line the Ship hath made her Way good on by the Compaſs; but when the Starboard Tacks are on board, the Leeway muſt be ſet to the Left-hand of the Line the Ship Capes on, *viz.* from S to P, ſo OP is the Line the Ship hath made her Way good on; and FS, P is her Courſe from the Falſe, or Magnetick South, *viz.* 31 deg. 38 min. and becauſe TS, P is her true Courſe it is clear (from the Figure) that TS, FS (the Variation) added to FS, P the Magnetick Courſe, the Sum TS, P, is her true Courſe from the true South, *viz.* South 41 deg. 29 min. Eaſt, Diſtance 33 Miles, that OD her true Difference of Latitude, is 24.7 and DP her true Departure is 21.8 as may by ſeen by the Operation.

PROBLEM III. CASE IV.

Example 2.

A Ship in 24 Hours, with her Larboard Tacks on board, ſails NNW. 15 Miles, NW half N. 9 Miles, N by W half W. 11 Miles, NNE. 10 Miles, Leeway upon each Courſe three quarters of a Point, Variation 9 deg. 30 min. Weſt; what is her true Courſe, Diſtance, Difference of Latitude and Departure for the whole time.

The

The Operation.

Courſes and Diſtances.	*Differ. Latitude.*		*Departure.*	
	N.	S.	E.	W
N N W. 15	5.7			13.9
N W half N 9	7.0			5.7
N by W ½ W. 11	10.5			3.2
N N E. 10	9.2		3.8	
	32.4		3.8	22.8 3.8
Falſe Diff. Lat.	32.4		falſe Dep. 19.0	

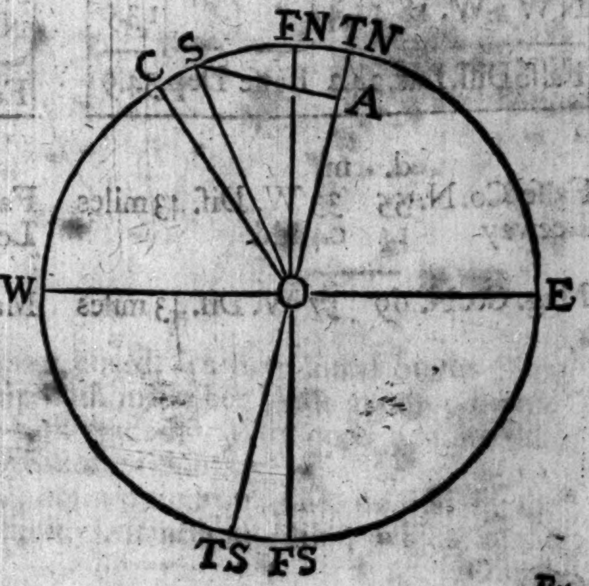
Her falſe Courſe is North 30 : 56 Weſt, Diſtance 38 Miles.
Leeway 8 : 26 Subtract

Her Magnetical Courſe is N. 22 : 30 Weſt, Diſtance 38 Miles
Variation 9 : 30 Weſt, add

Her true Courſe is North 32 : 00 Weſt, Diſtance 38 Miles, her true Difference of Latitude is 32.2 Miles, her true Departure 20.1 Miles.

Solution.

Set the falſe Courſe from FN to C, ſo will O C repreſent the Way of the Ship had ſhe made her Way as good as ſhe look'd; but becauſe ſhe had her Larboard Tacks on board, her Leeway muſt be ſet on the Right-hand of it, *viz.* at S, ſo will O S be the Line the Ship hath made her Way good on; therefore S, FN is her Magnetick Courſe, but FN, T N, is the Variation, and S, T N the true Courſe; ſo that by the Scheme, the falſe Courſe leſs the Leeway, is the Magnetick Courſe; and the Magnetick Courſe more the Variation, is the true Courſe; as in the Operation.



Example 3.

A Ship in 24 Hours, with her Starboard Tacks on board, ſails WNW. 15 Miles, N. W. 10 Miles, N W. half W. 18 Miles, with her Larboard Tacks on board, ſails E by N. 15 Miles ENE. 17 Miles, NE half E. 15 Miles, NE by N, 28 Miles; Leeway upon each Tack 1½ Point, by a Compaſs that varies 10 deg. 54 min. Weſt, what is her true Courſe, Diſtance, Difference of Latitude and Departure?

Here, becauſe the Ship hath tack'd in the 24 Hours, reduce the Courſes and Diſtances ſhe hath run with her Starboard Tacks on board, into one Courſe and Diſtance; do the ſame with the Courſes and Diſtances ſhe hath run with her Larboard Tacks on board, to each of theſe Courſes allow the Leeway, and you will have the Magnetick Courſe and Diſtance ſhe hath made upon each Tack: reduce theſe two Courſes and Diſtances into one Courſe and Diſtance, which you muſt correct by the Variation; and then you will have the true Courſe and Diſtance run, with which find her true Difference of Latitude and Departure. See the *Operation* and *Solution.*

The Operation on the Starboand Tacks.

Courſes and Diſtances.	*Dif. Latit.*		*Departure.*	
	N.	S.	E.	W.
WNW. 15	5.7			13.9
N W. 10	7.1			7.1
NW ½ W. 18	11.4			13.9
Falſe Diff. Lat.	24.2	Falſe	Dep.	34.9

The Operation on the Lauboard Tacks.

Courſes and Diſtances.	*Dif. Latit.*		*Departure.*	
	N.	S.	E.	W
E by N. 15	2.9		14.7	
ENE. 17	6.5		15.7	
NE ½ E. 15	9.5		11.6	
N E by N. 28	22.3		15.5	
Falſe Diff. Lat.	41.2	Falſe	57.5	Dep.

	d.	m.	
Falſe Co. N.	55	33 W.	Diſ. 43 miles
Leeway	14	04 add	
Mag. Co. N.	69	37 W.	Diſ. 43 miles

	d.	m.	
Falſe Co. N.	54	30 E.	Diſ. 71 miles
Leeway	14	04 add	
Mag. Co. N.	68	34 E.	Diſ. 71 miles

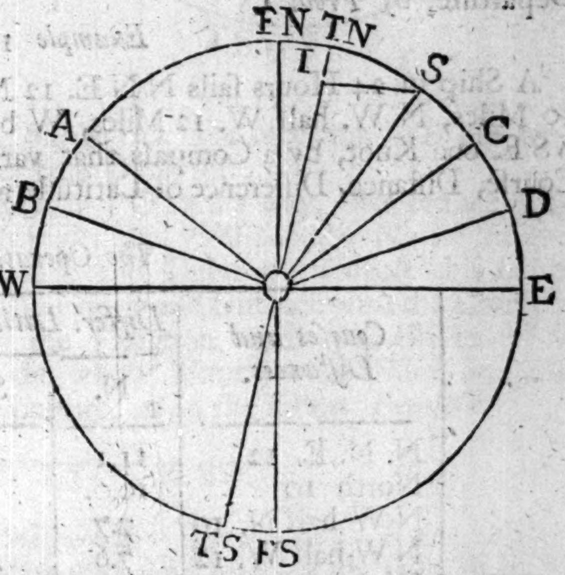
Courſes and Diſtances.	*Differ. Latit.* N	S	*Departure* E	W
N. 69 : 37 W. 43 Miles	15.0			40.3
N. 68 : 34 E. 71 Miles	26.0		66.1	
	41.0		66.1	40.3
			40.3	
Magnetick Diff. Latitude	41.0	Mag.	25.8 Depart.	

Magnetick Courſe N. 31 : 38 E. Diſtance 48 Miles
Variation 10 : 54 W. ſubtract

Her true Courſe is N. 20 : 44 E. Diſtance 48 Miles
Her true Difference of Latitude is 44.9 Miles
And her true Departure is 17.0 Miles

Solution

By the Operation, with her Starboard Tacks on board, we find the Courſes and Diſtances the Ship hath run, reduced, is North 55 : 33 Weſt, which is ſet off from FN to A, ſo is OA the Line the Ship hath made her Way good on by the Compaſs; but if a Ship ſails on the Line OA with the Starboard Tacks on board, and the Leeway 1¼ Points, it is plain, AB muſt be 1¼ Points to Leeward of OA, and therefore OB is the Line the Ship hath made her Way good on, upon that Tack, *viz.* North 69 : 37 Weſt, Diſtance 43 Miles.



Again, with her Larboard Tacks on board, we have found by the Operation, that OC is the Line the Ship hath made her Way good on by the Compaſs; but OD is the Line ſhe hath made her Way good on upon that Tack, *viz.* North 68 : 34 Eaſt, Diſtance 71 Miles.

Now, theſe two Courſes and Diſtances reduced into one, we find by the Operation, to be North 31 : 38 Eaſt, Diſtance 48 Miles, which is the

Courſe and Diſtance the Ship hath made good by the magnetick Compaſs, and ſet from FN to S, will be OS, the true Line the Ship hath made her Way good upon; but FN, TN is the Variation, and TN, S is her true Courſe, OS her true Diſtance run, OI her true Difference of Latitude, and IS her true Departure in Numbers, as you ſee in the Operation.

Note; In theſe three Examples, I have ſuppoſed the Leeway to be the ſame the whole 24 Hours, which often happeneth in Trade Winds; but ſhould the Ship often tack in the Time, and have different Leeways, allow a proper Leeway for each Courſe as you take them off the Log-board, which reduce into one, then allow the Variation, and you have the Ships true Courſe and Diſtance run.

PROBLEM III. CASE IV.

Various Courſes and Diſtances, with the Motion of a Current, and the Varition of the Compaſs given; to find the Ships true Courſe, Diſtance, and Difference of Latitude and Departure.

Rule. Reduce the given Courſes and Diſtances, with the motion of the Current for the whole Time, into one Courſe and Diſtance, by *Prob.* 3, *Caſe* 2.

Correct this Courſe by the Variation, by *Prob.* 3, *Caſe* 1.

With this Courſe and Diſtance, find the true Difference of Latitude and Departure, by *Prob.* 1.

Example 1.

A Ship in 24 Hours ſails NNE. 12 Miles, N 10 Miles, NW half N. 10 Miles, N W. half W. 12 Miles, W by S. 15 Miles, in a Current, ſetting SSE. one Knot, by a Compaſs that varies 10 : 12 Weſt, what is her true Courſe, Diſtance, Difference of Latitude and Departure.

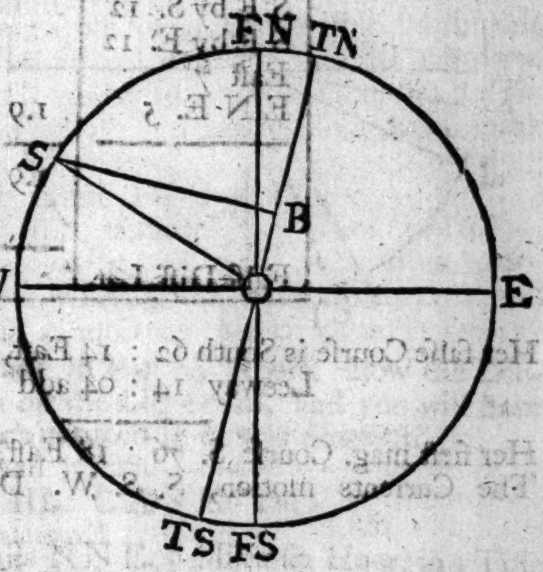
The Operation.

Courſes and Diſtances.	*Differ. Latitude.*		*Departure*	
	N.	S.	E.	W.
N. N. E. 12	11.1		4.6	
North 10	10.0			
N.W half N. 10	7.7			6.3
N W half W. 12	7.6			9.3
W. by S. 15		2.9		14.7
S. S. E. 24		22.2	9.2	
Sum	36.4 25.1	25.1	13.8	30.3 13.8
Diff. Latitude	11.3	False Departure		16.5

Her falſe Courſe is N. 55 : 33 W. Diſtance 20 Miles
Variation 10 : 12 W. add

Her true Courſe is N. 65 : 45 W. Diſtance 20 Miles, her true Difference of Latitude is 8.2, her true Departure 18.2.

Solution.



Having reduced the given Courſes and Diſtances, with the motion of the Current, *viz.* SSE. 24 Miles in 24 Hours, at one Knot or Mile *per* Hour, you will find by the Operation, her falſe Courſe is N. 55 : 33 W. which in the Figure, is ſet from FN to S, ſo will OS be the Line the Ship hath made her Way good on by the Compaſs; but S, TN is her true Courſe, which is greater than her falſe Courſe, by the Variation FN, TN, therefore their Sum, *viz.* 65:45 is the true Courſe, the true Diſtance, Difference of Latitude and Departure, the ſame as in the Operation, which in the Figure is repreſented by O S the Ships true Diſtance run, O B her true Difference of Latitude, and S B her true Departure.

But, ſhould the ſhip ſail cloſe haul'd in a Currents way, then reduce only the Courſes and Diſtances ſhe hath really run, without any Notice of the Leeway or Variation, into one Courſe and Diſtance; correct this ſingle Courſe by the Leeway, then reduce this Courſe and Diſtance with the Currents motion into one, which correct by the Variation, and you will have her true Courſe and Diſtance run for the whole Time; with which find her true Difference of Latitude and Departure, as in the follow *Example.*

PROBLEM III. CASE IV.

Example 2.

A Ship in 24 Hours, with her Starboard Tacks on board, ſails SE by S. 12 Miles, S E by E. 12 Miles, E. 7 Miles, E N E. 5 Miles, Leeway upon each Courſe 1¾ Point, in a Current ſetting S S W. 1½ Knot, by a Compaſs that varies 18 : 17 Eaſt, what is her true Courſe, Diſtance, Difference of Latitude and Departure.

The Operation.

Courſes and Diſtances.		*Dif. Latit.*		*Departure.*	
		N.	S.	E.	W
S E by S.	12		10.0	6.7	
S E by E.	12		6.7	10.0	
Eaſt	7			7.0	
E N E.	5	1.9		4.6	
		1.9	16.7 1.9	28.3	
Falſe Diff. Lat.			14.8	28.3	Falſe Dep.

Her falſe Courſe is South 62 : 14 Eaſt, Diſtance 32 Miles
Leeway 14 : 04 add

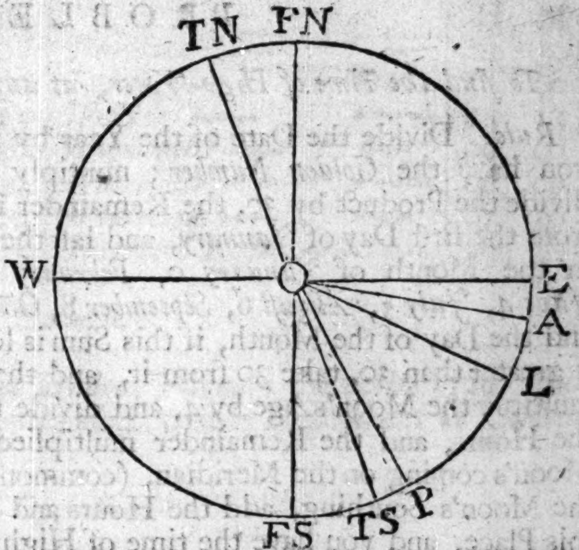
	S.	E.	W.
Her firſt mag. Courſe S. 76 : 18 Eaſt, Diſtance 32 Miles	7.6	31.1	
The Currents motion, S. S. W. Diſtance 36 Miles	33.3		13.8
	40.9	31.1 13.8	13.8
The ſecond magnetick Difference of Latitude	40.9	17.3 *mag. dep.*	

Therefore, the ſecond mag. Courſe is S. 23 : 12 E. Diſtance 44 Miles
Variation 18 : 17 E. ſubtract

And now her true Courſe is South 04 : 55 E. Diſtance 44 Miles, with which her true Difference of Latitude is found to be 43.8 Miles, and her true Departnre 3.8

Solution.

Becauſe the Variation is Eaſt, TN the true North, muſt be to the Weſtward of FN, the falſe North, becauſe it is the falſe North that varies from the true North; now her firſt falſe Courſe is South 62 : 14 Eaſt, which muſt be ſet from FS to L, ſo will OL be the Line the Ship hath made good by the Courſes ſhe hath Caped on; but if a Ship was to ſail on the Line OL with her Starboard Tacks on board, the Leeway will be on the Left-hand, becauſe the Wind is on the Right-hand ſide of the Ship, *viz* from



L to A, ſo will O A be the Way the Ship hath made good by the Wind; but while the Wind drove her upon this Line O A, the Current drove her S S W. 36 Miles in 24 Hours, which makes her ſecond magnetick Courſe be South 23 : 12 Eaſt, Diſtance 44 Miles; now this 23 : 12 muſt be ſet from F S to P, ſo will O P be the true Line the Ship hath made her Way good on; but T S, P is the true Courſe, which is leſs than F S, P by the Variation, as is ſeen in the Operation.

Note, If the Ship ſhould often tack in the 24 Hours, allow the Leeway to each Courſe as you take them off the Log-board, and you will have the firſt magnetick Courſe, with which proceed as in this *Example.*

PROBLEM III. CASE IV.

Example. A Ship in 24 Hours, ſails N N E. 9 Miles an Hour, in a Tide ſetting N E. 3 Miles, an Hour; what is her true Courſe and Diſtance *per* Hour?

The Operation.

Courſes and Diſtances.	*Differ. Latitude.*		*Departure.*	
	N.	S.	E.	W.
N N E. 9	8.3		3.4	
North Eaſt 3	2.1		2.1	
	10.4		5.5	

The *Operation* is ſo eaſy it needs no Explanation: you may ſufficiently underſtand it by the foregoing Caſes of this *Problem.*

Her Courſe is North 27 : 25 Eaſt, Diſtance 12 Miles *per* Hour *fere.*

And now, ſince we are talking about the Tides, it is neceſſary you ſhould learn to ſhift them; by which you will not only know which way the Tide runs, but when the Water riſeth and when it falleth, the proper Times of ſailing into or out of an Harbour of Moaring, or Unmoaring the Ship, to Weigh, or drop an Anchor, and while Riding with a ſingle Anchor, how to keep it clear, and when moar'd to keep a clear Hauſe; which are curious Properties in a careful Sailor, and brings us to the Conſideration of

PROBLEM IV.

To find the Time of High-Water, at any Place, any Day of the Year.

Rule. Divide the Date of the Year by 19, add 1 to the Remainder, and you have the *Golden Number*; multiply that *Golden Number* by 11, and divide the Product by 30, the Remainder is the *Epact*, both theſe commence from the firſt Day of *Jannary*, and laſt the whole Year: To the Epact add, in the Month of *January* 0, *February* 2, *March* 1, *April* 2, *May* 3, *June* 4, *July* 5, *Auguſt* 6, *September* 8, *October* 8, *November* 10, *December* 10, and the Day of the Month, if this Sum is leſs than 30 it is the Moon's Age; if greater than 30, take 30 from it, and the Remainder is the Moon's Age; multiply the Moon's Age by 4, and divide the Product by 5, the Quotient are the Hours, and the Remainder multiplied by 12, are the Minutes of the Moon's coming on the Meridian, (commonly called the Moon's Southing) to the Moon's Southing, add the Hours and Minutes oppoſite to the Place in this Place, and you have the time of High water at that Place.

	H	M		H	M
A*Mſterdam*	03	00	*St. Hellens*	10	30
Antwerp	06	00	*Harwich*	11	15
Alborough	09	45	*Kingſale*	04	30
Berwick	03	45	*Leigh*	00	00
The River of Bordeux	03	45	*Lisbon*	02	15
Baltimore	04	30	*London*	03	00
Briſtol	06	00	*Lin Regis*	06	00
Bridgewater	07	30	*Lime*	06	45
Cork	04	30	*Leyſtaff-Road*	10	30
Dover Peer	00	00	*Milford Haven*	07	30
Dartmouth	06	00	*Nore*	00	45
Dublin	08	15	*Newcaſtle*	05	15
Dungeneſs and Dunnoſe	09	45	*Needles*	08	15
Dover and in the Downs	10	30	*Orkneſs*	03	00
Edam	04	30	*Orkney*	09	00
Egmomt	09	00	*Orfordneſs within*	11	15
The Coaſt of Flanders	00	00	*Portſmouth*	00	00
Fluſhing	00	45	*Coaſt of Portugal*	03	45
Flamborough	04	30	*Plimouth*	05	15
Foy and Falmouth	05	15	*Quinborough*	00	00
Graveſend	01	30	*Rocheſter*	00	45
Guernſey	05	15	*Rotterdam*	03	00
Hampton-Key	00	00	*Robiu Hood's-bay*	03	00
Humber	05	15	*Roven*	03	45
Hull	06	00	*The Shoe*	00	00
Hamborough	06	00	*Spithead*	00	00

South-

	H.	M		H	M
Southampton	00	00	*Tinmouth*	01	30
Along the Swin	00	00	*Torbay*	06	00
The Spurn	05	15	*Wells*	05	15
Salcomb	06	00	*Weymouth*	06	00
Sedmouth	06	00	*Waterford*	06	00
The Start	06	00	*Winterton*	07	30
Shoreham	09	45	*Yarmouth Road*	10	30

Example.

What time was it High-water at *London*, *February* the 20*th*, 1729. *Anſwer*, 5h. 24m. that is, at 24 Minutes after 5, it is High-water at *London-Bridge.*

The Operation.

19)1729(91
171
19
19
00 nothing Remains,
therefore, 1 is the Golden Number.
11
30)11(0
11 the Epact.
2 for the Month *February.*
20 the Day of the Month.
33 the Sum.
30 Subtract.
3 Moon's Age.
4
5)12 (2h. : 24m. Moon Souths.
10 3 : 00 tabular Number for *London.*
2 5 : 24 the time of High-water.
12
24

Note, While the Moon is in the Increaſe, ſhe Souths before Midnight; while ſhe is decreaſing ſhe Souths before Noon. Theſe Things are known by every *Cabbin-Boy*, *Colliers Nag*, and *Watermans Servant*, therefore needs no farther *Explanation*, nor any other *Example.*

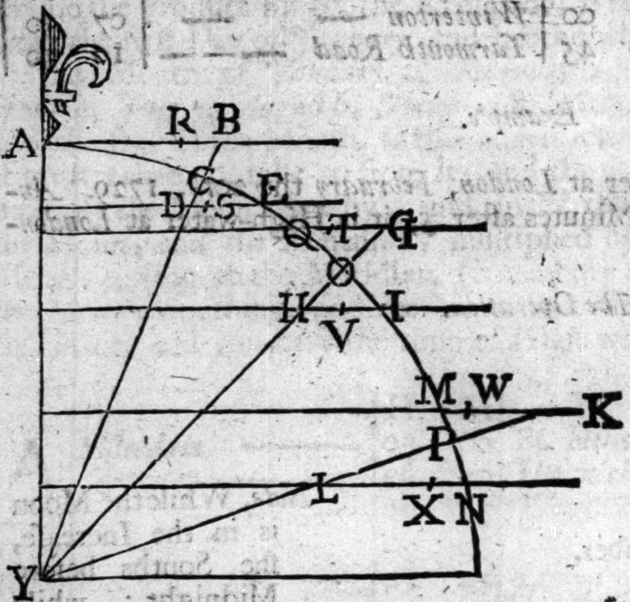
But now, altho you have uſed all the Art already laid down, to find the Ships true Courſe and Diſtance for 24 Hours run; you will rarely find it to agree with the Latitude found by Obſervation of the Sun, and therefore you will often have occaſion to correct this Courſe and Diſtance, found by Dead Reckoning, by your Obſervation, which is the Buſineſs of

PROB.

PROBLEM V.

To correct the Courſe and Diſtance found by Dead Reckoning, by an Obſervation of the Sun.

Note, We ſhall teach how to find the Latitude of the Place by Obſervation, and the Variation of the Compaſs in their proper Places; but firſt let us clear this Propoſition.



Suppoſe a Ship from Y, ſhould ſail NNE. to C, by Reckoning, but by Obſervation is found in the Parallel ARB, or in the Parallel DSE; it is clear, if you truſt to her Courſe ſhe will be at B or D, if you truſt to her Diſtance, ſhe will be at A or E; now the Error in her Courſe is inconſiderable to the Error in her Diſtance, and therefore when the Courſe is near the Meridian, it is ſafer truſting to the Courſe than to the Diſtance; though I would rather judge her at R or S, then at A, B, D, or E, that is, I would either increaſe her Courſe, or ſuppoſe it ſomething farther from the Meridian, and decreaſe the Diſtance, or make it leſs than it was by Dead Reckoning, or diminiſh the Courſe, and augment the Diſtance, according as by Obſervation, I find her to the Northward or Southward of my Reckoning.

Again, ſuppoſe a Ship from Y ſhould ſail N. E. to O, by Dead Reckoning, but by Obſervation is found on either the Parallels of Latitude QTG or HVI, it is plain, if you truſt to her Courſe, ſhe will be at H or G, if to her Diſtance at I or Q, but T being nearly equi-diſtant from Q, O, G, and V nearly equi-diſtant from H, O, I, I'd rather ſuppoſe her at T than at Q or G; and at V, rather than at H or I; that is, with the true Difference of Latitude and Courſe find a Departure; and with the true Difference of Latitude and Diſtance find a Departure; the half Sum of theſe Departures is her true Departure; with which, and the true Difference of Latitude, find the true Courſe and Diſtance.

Again, ſuppoſe a Ship from Y, ſhould ſail E. N. E. half E. to P, but by Obſervation is in the Parallel of MWK, or LXN, it is evident by her Courſe, ſhe will be at L or K, by her Diſtance at M or N; now the Error in her Diſtance is inconſiderable to the Error in her Courſe, therefore when you ſail near the Eaſt or Weſt, it is ſafer to depend on your Diſtance than Courſe; and more proper to imagine the Ship at W, than at M or K, *viz.* by increaſing your Diſtance and decreaſing your Courſe; and at X, than at L or N; by augmenting the Courſe and diminiſhing the Diſtance, *viz.* for every two or three Miles you increaſe or decreaſe your Diſtance, as many Quarter Points ſhould you augment, or diminiſh your Courſe, as is amply illuſtrated in the following *Examples*.

Caſe 1. Suppoſe a Ship by Dead-Reckoning had ſailed N by E. half E. 124 Miles, but by Obſervation her Difference of Latitude is 124 Miles, what is her true Courſe and Diſtance?

Anſwer, Her true Courſe I allow to be N by E. ¼ E. Diſtance 128 Miles, *viz.* by ſhortening the Courſe ¼ of a Point, and increaſing the Diſtance four Miles, ſo will her Difference of Latitude be 123.8, her Departure 30.9.

But in this *Example*, had her Difference of Latitude been but 114 Miles, her true Courſe I ſhould allow to be N. by E. ¾ E. Diſtance 121 Miles, her true Difference of Latitude will then be 113.9, her true Departure 40.3, which is got by increaſing her Courſe ¼ of a Point, and decreaſing her Diſtance 3 Miles.

Caſe 2. Suppoſe a Ship by Dead-Reckoning had ſailed N. E. half N. 120 Miles, but by Obſervation finds ſhe hath altered her Latitude 97 Miles, what is her true Courſe and Diſtance run?

With her true Diff. Lat. 97 Miles, and falſe Courſe N E half N. find a Departure, *viz.* —— —— —— —— —— —— } 79.2
With her true Diff. Lat. 97 Miles, and falſe Diſtance 120 Miles, find a Departure, *viz.* —— —— —— —— —— —— —— } 79.4

The Sum of the Departures 149.6

The half Sum of the Departures 74.8

is the true Departure, which with the true Difference of Latitude 97 Miles, you will find her true Courſe to be North 37 : 37 Eaſt, Diſtance 123 Miles.

But in this *Example*, had her Difference of Latitude by Obſervation been but 90 Miles, the Work would have thus ſtood.

With the true Dif. Lat. 90 Miles, and falſe Cou. N E ½ N. find a Dep. 74.1
With the true Dif. Lat. 90 Miles, and falſe Diſt. 120 Miles, find a Dep. 79.4

Sum 153.5

the half Sum 76.5

is her true Departure, and 90 Miles the true Difference of Latitude; you will find her true Courſe to be N. 40 : 26 E. Diſtance 118 Miles.

Caſe 3. Suppoſe a Ship by Account had ſailed E N E. half E. 87 Miles, but by Obſervation hath differed her Latitude 30 Miles, what is her true Courſe and Diſtance run?

Anſwer, Her true Courſe I will allow to be ENE. ¼ E. Diſtance 89 Miles, *viz.* by diminiſhing the Courſe ¼ of a Point, and augmenting the Diſtance 2 Miles.

And in this *Caſe*, had the Difference of Latitude by Obſervation, been but 20 Miles, I would have allowed her true Courſe to be E N E. ¾ E. Diſtance 84 Miles, *viz.* by augmenting her falſe Courſe, and ſhortening the falſe Diſtance; all which is plain from the foregoing Figure.

By what I have now ſaid of correcting the Dead-Reckoning in the N. E. Quarter of the Compaſs, there cannot, I think, be any Difficulty, in performing the ſame in any other Quarter; which is all I have to ſay on this ſingle Propoſition, of finding the Ships true Courſe and Diſtance run, or nearly eſtimating the ſame for 24 Hours, in the Daily Practice at Sea; it now only remains for me to ſhew how to uſe the ſame, in all the uſeful *Problems of Navigation*, and firſt by *Plain Sailing*.

Plain Sailing ſuppoſeth the Figure of this Terraqueous Globe to be a large extended Plain, on which the Equinoctial, the Meridians, the Parallels of Latitude, with all the other intermediate Rhombs, are repreſented by ſtrait Lines, the Meridians are parallel to each other, and every Parallel of Latitude is equal to the Equinoctial, than which, nothing can be more erronious; yet common Cuſtom hath ſo far enfluenced our common Sailors in this Particular, that they prefer this Kind of Sailing, before all the demonſtrative Truths that conſtantly are produced to the contrary: But, becauſe it is not alſtogether uſeleſs, but will ſerve in ſhort Voyages, and in Coaſting along the Shoar, we will not wholly neglect it, but uſe it as Introductory to the true Method of traverſing the boiſterous Main; in Order thereunto you muſt take particular Notice of the following Scheme of the *Plain Chart*, with the following Definitions and Conſequences flowing from them.

The Equinoctial, which Seamen call the Line, is an immaginary Eaſt and Weſt Line, ſuppoſed to croſs the middle of the Earth, and to divide the North part thereof from the South, *viz.* Æ Q.

The Latitude of a Place, is the Diſtance of the Place from the Equinoctial, and is North, if the Place is on the North ſide of the Equinoctial; but South, when the Place is on the South ſide the Equinoctial.

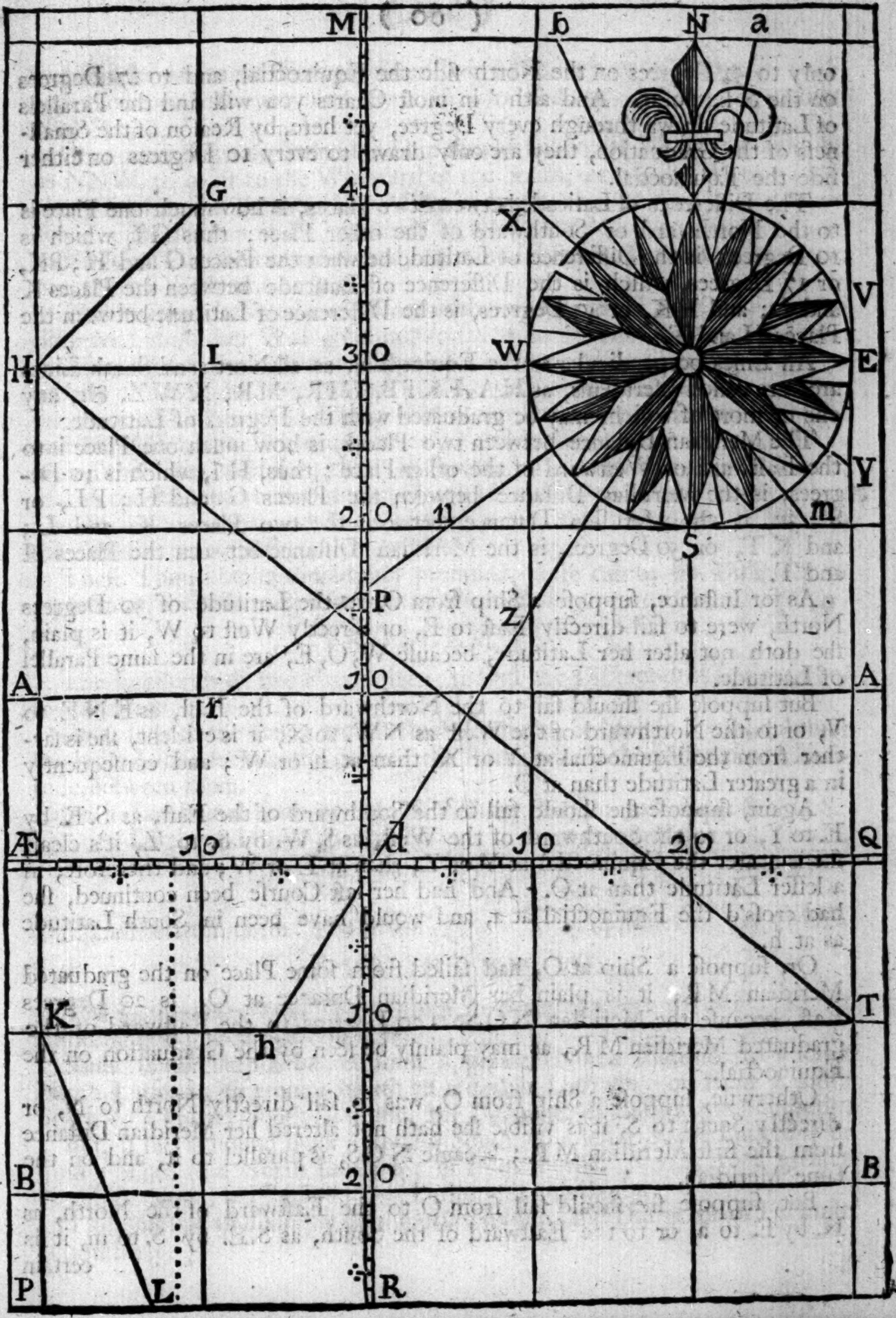
All Lines parallel to the Equinoctial, as all Eaſt and Weſt Lines are, are called Parallels of Latitude; and all the Places on the ſame Parallel of Latitude are in the ſame Latitude.

Thus, all the Places on the Line Æ Q, are in the Latitude of 00 : 00, becauſe from thence we begin to reckon the Latitude.

All the Places on the Line AA, are in the Latitude of 10 Degrees North, becauſe every Part of that Line is 10 Degrees from the Equinoctial, and on the North ſide of it.

All the Places on the Line BB, are in the Latitude of 20 Degrees South, becauſe that Parallel is 20 Degrees on the South ſide the Equinoctial.

Now you muſt know, that there is 90 Degrees of Latitude on either ſide the Equinoctial, tho' in this Figure, for want of Room, the Latitude runs only


M
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only to 52 Degrees on the North ſide the Equinoctial, and to 27 Degrees on the S. ſide of it. And altho' in moſt Charts you will find the Parallels of Latitude drawn through every Degree, yet here, by Reaſon of the Smallneſs of the Graduation, they are only drawn to every 10 Degrees on either ſide the Equinoctial.

The Difference of Latitude between two Places, is how much one Place is to the Northward or Southward of the other Place; thus G I, which is 10 Degrees, is the Difference of Latitude between the Places G and H; PK, or 17 Degrees, which is the Difference of Latitude between the Places K and L; and HK, or 40 Degrees, is the Difference of Latitude between the Places H and T.

All Lines perpendicular to the Equinoctial, as all North and South Lines are, are called Meridians, as HAÆKPB, GIR, MR, XWZ, &c. any one or more of which, may be graduated with the Degrees of Latitude.

The Meridian Diſtance between two Places, is how much one Place is to the Eaſtward or Weſtward of the other Place; thus, H I, which is 10 Degrees, is the Meridian Diſtance between the Places G and H; PL, or 8 : 30, is the Meridian Diſtance between the two Places K and L; and KT, or 50 Degrees, is the Meridian Diſtance between the Places H and T.

As for Inſtance, ſuppoſe a Ship from O, in the Latitude of 30 Degrees North, were to ſail directly Eaſt to E, or directly Weſt to W, it is plain, ſhe doth not alter her Latitude, becauſe W, O, E, are in the ſame Parallel of Latitude.

But ſuppoſe ſhe ſhould ſail to the Northward of the Eaſt, as ENE. to V, or to the Northward of the Weſt as NW. to X, it is evident, ſhe is farther from the Equinoctial at V or X, than at E or W; and conſequently in a greater Latitude than at O.

Again, ſuppoſe ſhe ſhould ſail to the Southward of the Eaſt, as S.E. by E. to Y, or to the Southward of the Weſt, as S.W. by S. to Z, it's clear, ſhe is nearer the Equinoctial at Y or Z, than at E or W; and therefore, in a leſſer Latitude than at O. And had her laſt Courſe been continued, ſhe had croſs'd the Equinoctial at a, and would have been in South Latitude as at h.

Or, ſuppoſe a Ship at O, had ſailed from ſome Place on the graduated Meridian MR, it is plain her Meridian Diſtance at O, is 20 Degrees Eaſt, becauſe the Meridian NOS, is 20 Degrees to the Eaſtward of the graduated Meridian MR, as may plainly be ſeen by the Graduation on the Equinoctial.

Otherwiſe, ſuppoſe a Ship from O, was to ſail directly North to N, or directly South to S, it is viſible ſhe hath not altered her Meridian Diſtance from the firſt Meridian MR; becauſe NOS, is parallel to it, and on the ſame Meridian.

But, ſuppoſe ſhe ſhould ſail from O to the Eaſtward of the North, as N. by E. to a, or to the Eaſtward of the South, as S.E. by S. to m, it is certain ſhe is farther from the Meridian MR, at a or m than at N or S, and therefore hath increaſed her Meridian Diſtance, by the Departures Na, Sm.

Once more, ſuppoſe from O, a Ship ſhould ſail to the Weſtward of the N. as NNW. to b, or to the Weſtward of the South, as SW by W. to n; it is clear, ſhe is nearer the Meridian MR, at b or n, than at N or S, and therefore nearer it than at O, and hath decreaſed her Meridian Diſtance; and had this laſt Courſe been continued, ſhe would have croſſed it at q, and have been to the Weſtward of it at r.

The Bearings between two Places is the true Point of the Compaſs, the Ship muſt make her Way good on, to ſail from the one Place to the other.

The Diſtance between two Places, is how many Miles (but very often we reckon it in Leagues, *viz.* 3 Miles in 1 League) on a direct Line or Rhomb, one Place is from another. Thus, GH is the Diſtance between the Places G and H; GI is the Diſtance between G and I, therefore when two Places are on the ſame Meridian, their Difference of Latitude is their Diſtance; HI is the Diſtance between the Places H and I, and conſequently when two Places bear Eaſt and Weſt of each other, their Meridian Diſtance is the Diſtance between them.

Theſe Things being thoroughly premiſed, there can be no Difficulty in performing the following *Problems* of *Plain Sailing*.

PROBLEM VI.

The Latitudes of two Places given; to find the Difference of Latitude between them.

Rule. If both the Places are in North Latitude, or both in South, ſubtract the leſſer Latitude from the greater, the Remainder is the Difference of Latitude between them.

Exqm. 1. Lat. bound from	51 : 32 N.	*Examp.* 2. 34 : 34 S.	*Ex.* 3. 8 : 15 S.
Lat. bound to	38 : 38 N.	15 : 30 S.	13 : 10 N.
	12 : 54	19 : 04	21 : 25
	60	60	60
Diff. Lat. between them	774 Miles	1144 Miles	1285 Miles

PROBLEM VII.

The Latitudes of two Places given, to know whether the Difference of Latitude is Northerly or Southerly.

Rule. If the Ship is bound from a greater North Latitude to a leſſer North Latitude, or from a North to a South Latitude; or from a leſſer South to a greater South Latitude, her Difference of Latitude is Southerly.

But, if ſhe is bound from a greater South, to a leſſer South Latitude, or from a South to a North Latitude; or from a leſſer North, to a greater North Latitude, her Difference of Latitude is Northerly.

Thus, in the *1ſt Example* of the *6th Problem*, the Difference of Latitude is Southerly.

In the 2*d. Example* of the ſame *Problem*, the Difference of Latitude is Northerly.

And, in the 3*d Example* it is alſo Northerly, which is Illuſtration ſufficient for this *Problem. Note*, The Courſe is always of the ſame Denomination as the Difference of Latitude.

PROBLEM VIII.

The Latitude come from, with the Difference of Latitude made ſince, given; to find the Latitude come into.

Rule. If a Ship is in North Latitude and ſails to the Northward, or in South Latitude and ſails to the Southward, ſhe increaſeth her Latitude; therefore the Difference of Latitude reduced into Degrees and Minutes (becauſe the Latitude is always kept in Degrees and Minutes) muſt be added to the Latitude come from, the Sum is the Latitude come into.

But, if a Ship in North Latitude ſails to the Southward, or in South Latitude ſails to the Northward, ſhe decreaſeth her Latitude; therefore the Difference of Latitude taken from the Latitude come from, leaveth the Latitude come into.

Note, In this Clauſe, if the Difference of Latitude is greater than the Latitude come from, the Ship hath croſſed the Equinoctial.

Ex. 1. Lat. come from	42 : 10N.	*Ex.* 2. 31 : 10 N.	*Ex.* 3. 1 : 10N.
Difference of Latitude	1 : 14 N.erly	2 : 30 S.erly	2 : 05S.erly
Latitude come into	43 : 24 N.	28 : 40 N.	0 : 55 South.
Ex. 4. Lat. come from	27 : 10 S.	*Ex.* 5. 10 : 14 S.	*Ex.* 6. 00 : 15 S.
Difference of Latitude	1 : 24 S.erly	1 : 30 N.erly	2 : 10N.ly
Latitude come into	28 : 34 S.	8 : 44 S.	1 : 55 N.

PROBLEM IX.

The Meridian Diſtance the Ship had made, with the Departure made ſince given; to find the Meridian Diſtance ſhe has then made.

Rule. If the Ship is on the Eaſt ſide of the Meridian departed from, and ſails to the Eaſtward, or on the Weſt ſide of it and ſails to the Weſtward, ſhe runs farther from it, and therefore the Departure added to it, is the preſent Meridian Diſtance.

But, if ſhe is on the Eaſt ſide of it, and ſails to the Weſtward; or on the Weſt ſide and ſails to the Eaſtward, ſhe comes nearer to it; and therefore her Departure taken from the former, leaves her preſent Meridian Diſtance.

Note, In this Clauſe, if the Departure is the greater Number, ſhe hath croſſed the Meridian ſailed from.

PROBLEM X.

The Meridian Diſtance the Ship had to make to any Place, with the Departure made ſince given, to find the Meridian Diſtance ſhe has to make to that Place.

Rule. If ſhe had E. Meridian Diſtance to make, and ſails to the Eaſtward, or W. and ſails to the Weſtward, ſubtract the Departure ſhe has made from it, you have left the Meridian Diſtance ſhe has to make to the Place, which is of the ſame Name, except the Departure is greateſt, and then it is of a different Denomination.

But, if ſhe had Eaſt Meridian Diſtance to make, and ſails to the Weſtward, or Weſt Meridian Diſtance to make, and ſails to the Eaſtward, ſhe runs out of her Way; and therefore add the Departure ſhe hath made, to the Meridian Diſtance ſhe had to make, the Sum is the Meridian Diſtance ſhe hath to make to the Place bound to.

Note, We need not exemplify this nor the foregoing *Problems*, the Method being the very ſame of ſailing nearer to, or farther from the Meridian come from or bound to, as it is in ſailing to or from the Equinoctial; which we have already ſufficiently explained.

PROBLEM XI.

The Latitude and Meridian Diſtance the Ship had made, with the Courſe and Diſtance the Ship hath made ſince, given; to find the Latitude and Meridian Diſtance ſhe hath then made.

Rule. With the given Courſe and Diſtance find her Difference of Latitude and Departure, with the Latitude come from; and Difference of Latitude, find her Latitude come into; with the Meridian Diſtance ſhe had made, and Departure, find the Meridian Diſtance ſhe hath made, by *Problems* 1, 8 and 9.

Example.

A Ship from the Latitude of 49 : 50 North, and Meridian Diſtance 3 : 10 E. ſails S W half W. 120 Miles, what is her Latitude come into, and Meridian Diſtance now made?

The Operation.

Latitude come from ———— 49 : 50 N. Mer. Diſtance 3 : 10 E.
S W half W. 120 Miles, gives 1 : 16 S. Diff. Lat. add 1 : 33 W. Dep

therefore, the Latitude come into 48 : 34 N. Mer. Diſtance 1 : 37 E.

This *Operation* is ſo plain we need ſay no more to make it inteligible to the meaneſt Capacity, nor need we illuſtrate it with any other *Examples* of perplext *Caſes* of *Problem* 3. you are there ſufficiently ſhewn how to find the Ships true Courſe and Diſtance run, which you muſt know before you can proceed in this, or any of the other following *Problems*.

PROBLEM XII.

The Latitude the Ship is in, and the Meridian Diſtance the Ship hath made, with the Latitude of the Place bound to, and Meridian Diſtance to that Place; and the Courſe and Diſtance the Ship hath run ſince, given; to find the Latitude the Ship is now in, and Meridian Diſtance the Ship hath now made, and the Bearing and Diſtance to her Port.

Rule. With the given Courſe and Diſtance, find her Difference of Latitude and Departure.

With the Latitude and Meridian Diſtance given, and this Difference of Latitude and Departure, find the Latitude ſhe is in, and Meridian Diſtance ſhe hath now made.

With the Difference of Latitude, and Meridian Diſtance ſhe had to make, and this Difference of Latitude and Departure, find the Difference of Latitude and Meridian Diſtance ſhe hath to make.

With this Difference of Latitude and Meridian Diſtance, find the Bearings off, and Diſtance to her Port.

Example.

A Ship from the *Lizard* in the Latitude of 49 : 55 N. Meridian Diſtance 00 : 00, is bound to Cape *Finiſter*, in the Latitude of 43 : 10 N. Meridian Diſtance 3 : 18 W. or 198 Miles, ſhe ſails S W by S. 50 Miles, what is her Latitude come into, Meridian Diſtance now made, and the Bearings and Diſtance of Cape *Finiſter* ?

The Operation.

Latitude come from 49 : 55 N. Mer.-diſt. 00 : 00 from the *Lizard*
SW by S. 50 Miles Diff. Lat. 00 : 42 S. Departure 00 : 38 Weſt.

Her Latitude come into is 49 : 13 N. Mer.-diſt. 00 : 28 W. from the *Liz.*
The Latitude bound to is 43 : 10 N. Mer.-diſt. 03 : 28 Weſt.

The Diff. Lat. to make is 6 : 03 Merid.-diſt. 02 : 50
60 60

363 S. 170 W.

And therefore Cape *Finiſter* bears S. S. W. ¼ Weſt Diſtance 400 Miles, or 133 Leagues.

This is all that is neceſſary, or practical at Sea by *Plain Sailing*, though the *Operation* of the 11th and 12th *Problems*, may more eaſily be performed by the following tabular Method, having firſt attained to the true Courſe the Ship hath made good in the 24 Hours, by *Prob.* 3. as we ſaid at the Concluſion of the 11th *Problem*, and therefore ſhall propoſe no other *Examples* here, only refer you to the following Tables with the *Examples* contained therein: In which you muſt obſerve, that in the firſt Column is the Day of the Week, in the ſecond is the Day of the Month, in the third is the Courſe, and in the fourth is the Diſtance that the Ship hath made good in the 24 Hours, in the fifth or ſixth is the Difference of Latitude, ac-that Place; and the Courſe and Diſtance the Ship hath run ſince, given; to find the Latitude the Ship is now in, and Meridian Diſtance the Ship hath now made, and the Bearing and Diſtance to her Port.

Rule. With the given Courſe and Diſtance, find her Difference of Latitude and Departure.

With the Latitude and Meridian Diſtance given, and this Difference of Latitude and Departure, find the Latitude ſhe is in, and Meridian Diſtance ſhe hath now made.

With the Difference of Latitude, and Meridian Diſtance ſhe had to make, and this Difference of Latitude and Departure, find the Difference of Latitude and Meridian Diſtance ſhe hath to make.

With this Difference of Latitude and Meridian Diſtance, find the Bearings off, and Diſtance to her Port.

Example.

A Ship from the *Lizard* in the Latitude of 49 : 55 N. Meridian Diſtance 00 : 00, is bound to Cape *Finiſter*, in the Latitude of 43 : 10 N. Meridian Diſtance 3 : 18 W. or 198 Miles, ſhe ſails SW by S. 50 Miles, what is her Latitude come into, Meridian Diſtance now made, and the Bearings and Diſtance of Cape *Finiſter* ?

The Operation.

Latitude come from	49 : 55 N.	Mer.-diſt.	00 : 00 from the *Lizard*
SW by S. 50 Miles Diff. Lat.	00 : 42 S.	Departure	00 : 38 Weſt.
Her Latitude come into is	49 : 13 N.	Mer.-diſt.	00 : 28 W. from the *Liz.*
The Latitude bound to is	43 : 10 N.	Mer.-diſt.	03 : 18 Weſt.
The Diff. Lat. to make is	6 : 03	Merid.-diſt.	02 : 50
	60		60
	363 S.		170 W.

And therefore Cape *Finiſter* bears S. S. W. ¼ Weſt Diſtance 400 Miles, or 133 Leagues.

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Week Days.	M·D.	Courſe.	Diſtance.	Diff. Lat.		Departure		Latit. come into.	Mer. Diſt. from the Lizard.	Diff. Lat. to make.	Mer. Diſ. to make.	Cape Finiſter.	
				N.	S.	E.	W.					Bearings.	Diſt.
Bound from	the	Lizard.						49:55N.		405 S.	198W		
Saturday	8	S W by S.	50		41.6		27.8	49:13N.	00:28W.	363 S.	170W	SSW. 1qr. W	400
Sunday	9	S. W. ¼ W.	74		49.7		54.8	48:23N.	01:23W.	313 S.	115W	S. 20 : 02 W	333
Monday	10	S. W. half S.	100		77.3		63.4	47:06N.	02:26W.	236 S.	52W	S. 12 : 39 W	242
Tueſday	11	W S W. ½ W	62		18.0		59.3	46:48N.	03:25W.	218 S.	7 E	S. 01 : 45 E.	218
Wedneſday	12	SSW ¼ W.	69		59.2		35.5	45:49N.	04:01W.	159 S.	43 E	S. 14 : 46 E.	164
Thurſday	13	S. 3 quart. W.	44		43.5	6.5		45:05N.	03:54W.	115 S.	36 E	S by E half E	120
Friday	14	S W by S.	72		59.8		40.0	44:05N.	04:34W.	55 S.	76 E	S. 54 : 08 E.	94
Saturday	15	N. 80:30 W.	36	6.0			35.5	44:11N.	05:10W.	61 S.	112 E	S. 61 : 31 E.	128
Sunday	16	S 13 E.	25		24.3	5.6		43.47N.	05:04W.	37 S.	106 E	S. 70 : 40 E.	112
Monday	17	S by E half E.	62		59.3	18.0		42.48N.	04:46W.	22 N	88 E	ENE. 3qrs. E.	91
Tueſday	18	S. E.	74		52.3	52.3		41.56N.	03:54W.	74N	36 E	N 25 : 40 E.	83
Wedneſday	19	S E. half E.	64		40.6	49.5		41.15N.	03:04W.	115N	14W	N. 07 : 02 W	116
Thurſday.	20	E. N. E.	24	9.2		22.2		41.24N.	02:42W.	106N	36W	N. 18 : 38 W	112

cording as it is North or South; in the ſeventh or eighth is the Departure, according as it is Eaſt or Weſt, anſwering to the foregoing Courſe and Diſtance in the third and fourth Columns; in the Ninth Column is the Latitude come into, which is always found by the Latitude the Ship was in the Noon before, and the Difference of Latitude in the fifth or ſixth Columns; in the tenth Column is the Meridian Diſtance the Ship hath made from the Land laſt ſeen, which is found by the Departure in the ſeventh or eighth Columns; and the Meridian Diſtance the Ship had made the Noon before; all which you have by the 11th *Problem*, and is diſtinguiſhed from the four following Columns by a double Line; in the firſt of which Columns is the Difference of Latitude the Ship is to make to any Cape or Port, which in our *Examples* is Cape *Finiſter*, and may be taken from a *Plain Chart* of the Voyage, or from a Table ſhewing the Latitudes of the Places come from and bound to, *viz.* 405 Miles South; which is to be increaſed or decreaſed by the daily Difference of Latitude in the fifth or ſixth Columns; in the ſecond Column from the double Line, is the Meridian Diſtance the Ship has to make to the Port bound to, which is firſt known by a *Plain Chart*, neceſſary for the Voyage, &c. in our *Examples* is 198 Miles Weſt, but afterwards by the Meridian Diſtance the Ship had to make the Noon before, and Departure ſhe hath made ſince, in the ſeventh and eighth Columns; with this firſt and ſecond Columns (after the double Line) is found the Bearings and Diſtance to her Port, by *Prob. 2d.* which is Cape *Finiſter* in our *Examples*, and are placed daily in the third and fourth Columns after the double Line; all which is ſo plain and eaſy to be underſtood at firſt Sight of the Table, that we need inſiſt no farther thereon. Thus have we finiſhed *Plain Sailing*; now let us proceed to *Mercator*, or Sailing by the *True* SEA-CHART.

MERCATORS-SAILING.

TO prove the rotundity of the Body of the Earth, by a great many Reaſons would be ſuperfluous; becauſe none but Children and down right Naturals (may they be allowed to think) think the contrary; therefore I ſhall now only let you know, that as the Shadow of the Body of the Earth, upon the Body of the Moon, at all Times and Places, of a Lunar Eclipſe, being circular; the Body from whence this circular Shade is produced, muſt conſequently be Globular; and therefore, the Body of this Earth is Globular, or Spheriodical: And if ſo, the Equinoctial, the Meridians and the Parallels of Latitude are Circles; all the other intermediate Rhombs are Loxodromical (or inclining Spiral Lines) making equal Angles with all the Meridians they paſs, very difficult to be nearly, impoſſible to be truly laid down in *Plano*, by the moſt ingenious, nor of any great Service to a Sailor; for which Reaſon our own Countryman Mr. *Edward Wright*, invented Numbers, called Meridional Parts, whoſe Properties are to lay down, on a

Plain Superficies the ſpherical Surface of the Earth; every Place having its peculiar Latitude and Longitude, with their true Bearings and Diſtances aſunder; all which he hath performed only by Right Lines, both uſeful and eaſy for the Sailor. And as few who have Charge of a Ship but have Charts of this Kind, with their Uſes annext to them, I ſhall ſay no more of it here, but ſhew how it differs from the *Plain Chart*, in Page 59.

In the *Mercator*'s *Chart*, you will find the Meridian graduated with the Degrees of Latitude as in the *Plain*, only with this Difference, that as they come nearer to the Poles, the Parallels of Latitude lye farther aſunder than at the Equinoctial, in the ſame Proportion that the Parallels themſelves decreaſe, as they approach the Poles.

That in our *Plain Charts* the Equinoctial, nor any of the Parallels of Latitude are graduated; but in the *Mercator*, you will find the Equinoctial graduated with the Degrees of Longitude from ſome Meridian, 180 Degrees to the Eaſtward, which are called Degrees of Eaſt Longitude, and as many to the Weſtward, which are called Degrees of Weſt Longitude, in all making 360 Degrees round the Earth. And therefore,

The Longitude of a Place, is the Degrees of the Equinoctial intercepted between the firſt Meridian, and the Meridian of that Place, and is Eaſt or Weſt according as the Place is to the Eaſtward or Weſtward of the firſt Meridian.

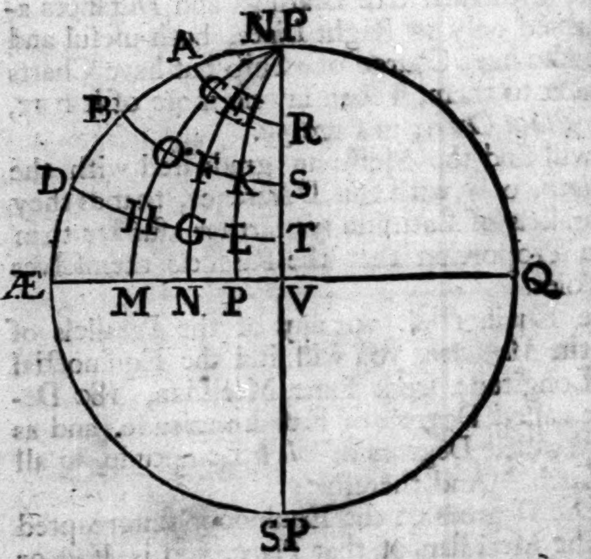
The Difference of Longitude betweeen two Places, is the Degrees of the Equinoctial intercepted between the Meridians of thoſe Places, and is Eaſt or Weſt, according as one Place is to the Eaſtward or Weſtward of the other Place.

All the other Properties of the *Mercators Chart* in reſpect of the Latitude, are the ſame as in the *Plain Chart*; and all in reſpect of the Longitude come into, or the Difference of Longitude betwëen two Places, in the *Mercators Chart*, are the ſame as the Meridian Diſtance and Departure, in the *Plain Chart*; and therefore we need lay down no other Rules for the Longitude here, then are laid down for the Meridian Diſtance there; which is the Reaſon I graduated the Part of the Equinoctial, in the *59th* Page.

But now, as this *Mercator Sailing* may be performed two Ways, *viz.* by the Meridional Parts, or by the Middle Latitude, I have choſen the latter, becauſe the Difference of Longitude by the Meridional Parts, muſt be found by the Courſe the Ship hath made good in 24 Hours, which is very uncertain; but the Latitude we are often certain of by Obſervation, and therefore the Difference of Longitude may be found by the Middle Latitude, more true than by the Courſe and Meridional Difference of Latitude. I could give many more Reaſons, but I think this ſufficient.

In the following Scheme, let the Primitive Circle repreſent the Meridian of any Place, which is a great Circle on the Surface of the Earth, the Line ÆMNPQ, repreſent the Equinoctial, which is alſo a great Circle on the Surface of the Earth, tho it is here repreſented by a Right Line, becauſe one half of the Earths ſpherical Superfices is laid down in Plano, or upon a

plain



plain Superficies, the Circles MHOCNP, NGFENP, PLKINP, and VTSRNP, are Part of Meridians, and might have been carried as well to SP (the South Pole) as they are from the Equinoctial to NP (the North Pole) the ſmall Circles DHGLT, BOFKS, and ACEIR, are only Parts of the Parallels of as many Latitudes, ſufficient to explain the Subject I am now on; tho' on the Surface of the Earth they go round the ſame, and in this Scheme might have been carried to the oppoſite Part of the primitive Meridian NPQ. By which Scheme you muſt obſerve, that the Meridians continually approximate each other till they all meet in the Poles of the World, and that the Parallels of Latitude continually decreaſe, as they run or lye from the Equinoctial towards the Poles; which proves that *Plain Sailing* muſt be vaſtly erroneous in great Runs; for ſuppoſe a Ship from A ſhould ſail Eaſt to C, then South to O, it is plain that AC is her Departure, or Meridian Diſtance; but had ſhe from A, ſailed South to B, then Eaſt to O, it is clear that BO is her Meridian Diſtance, but BO is greater than AC, which was her Meridian Diſtance before, and therefore there may be as many Meridian Diſtances between the Places A and O, as it is poſſible to deſcribe Parallels of Latitude between AC and BO, and all different from each other; but between the Places A and O there is but one Difference of Longitude, *viz.* ÆM, and this ſame ÆM is not only the Difference of Longitude between the Places A and O, but it is alſo the Difference of Longitude between all the Places on the Meridian ABD, and the Meridian HOC, to find and uſe which, will be the proper Buſineſs of this Part of our Treatiſe: Before which it is neceſſary to have this Table of the Latitude and Longitude of the moſt principal Places uſed in Navigation, for the Uſe of thoſe that cannot afford proper Charts for their Voyages, accounting the Longitude from the Meridian of *London*, *viz.* 180 Degrees to the Eaſtward, and as many to the Weſtward of the ſaid Meridian.

Places Names.	Latitude	Longit.
Coaſt of *England.*	D. M.	D. M.
Berwick	55 50	01 39W
Newcaſtle	54 58	01 30W
Stocton	54 33	01 25W
Spurn	53 35	00 30E
Yarmouth	52 45	01 40E
North Foreland	51 28	01 10E
Beachy Head	50 48	00 25E
Dunnoſe	50 38	01 23
Portland Bill	50 30	02 48
The Start	50 09	02 45
Lizard	49 55	05 14
Lands end	50 06	06 00
St. Mary's Scilly	49 57	06 45
Hartland Point	51 06	04 35
Lundy Iſle	51 02	04 40
St. Davids-head	52 55	05 22
Barſey Iſle	53 46	04 58
Holy Head	53 23	04 40
Liverpool	53 20	02 58
White Haven	54 25	03 15
Carliſle	54 45	02 25

North Latitude. Weſt Longitude.

Coaſt of *Scotland*

Places Names.	Latitude	Longit.
Glaſcow	55 53	04 05
N. part of Sky Iſle	57 50	05 21
N. part of Lewis Iſle	58 20	07 15
St. Kilda	58 02	10 05
Farra Head	58 23	05 05
N. Iſles of Orkney	59 13	03 30
S. point of Shetland	59 52	01 30
Buchaneſs	57 55	01 20
Aberdeen	57 24	01 37
Dundee	56 30	02 36
Edenburgh	55 57	02 46

North Latitude. Weſt Longitude.

Coaſt of *Ireland.*

Places Names.	Latitude	Longit.
	D. M.	D. M.
Dublin	53 20N	07 06W
Wexford	52 13N	07 15W
Waterford	52 07N	07 52W
Cork	51 49N	09 30W
Cape Clear	51 10 N	10 30
Limrick	52 22 N	09 48
Galway	53 10 N	10 03
Slinehead	53 20 N	11 15
London derry	54 55 N	08 30
Bellfaſt	54 36 N	06 50

W. Long.

The Coaſt of *Holland* and *Flanders.*

Places Names.	Latitude	Longit.
Scaw	57 26	10 10
Helighland	54 28	30 35
Hambrough	53 41	10 24
Emden	53 05	08 00
The Fly	53 18	05 35
The Texel	53 10	04 59
Amſterdam	52 21	04 51
Rotterdam	51 55	04 21
The Brill	51 56	04 10
The Sluyce	51 19	03 50
Calice	50 57	02 00

North Latitude. Eaſt Longitude.

The Coaſt of *France* and *Portugal*

Places Names.	Latitude	Longit.
Diep	49 56	01 06½E
Cape de Hague	49 46	02 06
The Caskets	49 50	02 32
Guernſey	49 36	02 40
Uſhant	48 30	05 05
Bell Iſle	47 20	03 10
Dieu Iſland	46 40	02 15
Ree Iſland	46 13	01 30
Cape Ortegal	44 02	07 40
Cape Finiſter	43 06	10 00
Porto Port	41 18	09 20
Burlings	39 39	10 15
Cape Roxent	38 54	10 20
Cape St. Vincent	37 00	09 32
Cadiz	36 16	07 00
Cape Trefalgar	36 10	06 30

North Latitude. Weſt Latitude.

In

Places Names	Latitude D.	M.	Longit. D.	M.
In the *Mediteranean Sea.*				
Gibralter	36	11	05	43W
Cape de Gat	37	03	02	02W
Cape Paul	37	58	00	22W
Cape Martin	39	00	00	28
Barcelona	41	30	02	21
Marcellies	43	20	05	15
Toulon	43	06	05	40
Genoa	44	25	08	40
Leghorn	43	18	10	29
Rome	41	51	12	28
Naples	41	05	14	28
Cape Spartavento	38	00	16	58
Cape Collone	37	10	18	00
Gallipoli	40	08	18	39
Cape St. Mary	39	56	19	00
Ancona	43	31	14	40
Venice	45	18	13	10
Lepanto	38	20	21	51
Cape Matapan	36	35	22	20
Cape St. Angelo	36	41	23	20
Anthens	38	00	24	29
Cape Martelo	38	00	25	45
Cape Monte Sancto	40	05	26	05
Gallipoli	40	30	27	58
Conſtantinople	41	07	30	00
Smyrna	38	30	27	27
Epheſus	37	54	27	15
Antiochetta	36	40	31	37
Scanderoon	36	00	35	58
Tripoli	34	40	35	40
Alexandria	31	07	30	50
Cape Ruſato	33	15	21	55
Cape Miſorato	32	43	16	23
Tripoli	32	55	13	00
Cape Bona	37	05	10	00
Bona	37	00	07	00
Algier	36	40	03	05
Cape Tres Forcas	35	34	01	25W

North Latitude. East Longitude.

Places Names.	Latitude D.	M.	Longit, D.	M.
Tetuan	35	28	05	52W
Seuta	35	55	05	47W
Tangier	35	55	06	14W
Alboran	36	10	02	30W
Formentaria	38	44	01	50
Yvica	39	05	02	50
Majorca City	39	48	02	49
Port Mahon	39	42	04	42
Gallitta	37	40	08	34
S. end of Sardinia	39	12	08	34
N. end of Corſica	42	57	09	45
Gorgona	43	34	09	38
Captia	43	06	09	40
Liſboa	42	44	10	05
Meſſina	38	22	06	25
Maritimo	38	12	11	55
Cape Paſſaro	36	48	16	04
Malta	36	15	14	35
Corfu	39	45	20	42
Cephalonia	38	15	21	49
Zant	37	47	21	10
Lemnos	39	50	25	27
Scio	38	23	23	55
W. end of Candy	35	20	23	27
E. end of Candy	35	20	26	31
W. end of Cyprus	35	21	31	35
E. end of Cyprus	35	35	34	25

North Latitude. East Longitude.

Barbary and *Guinea.*

Places Names.	Latitude D.	M.	Longit, D.	M.
Cape Spartel	35	46	05	55
Salle	33	43	06	30
Cape Cantin	32	16	09	20
Cape de Geer	3c	41	10	10
Cpe Bajador	26	12	14	30
Cape Clerado	23	41	15	50
Cape Blanco	20	35	16	55
Senegal	15	16	15	40
Cape de Verd	10	30	16	26
River Gambia	13	16	15	20

North Latitude. West Longitude.

Serra-

Places Names.	Latitude			Longit.		
Barbary and *Guinea*	D.	M.		D.	M.	
Serralion	08	36		12	15W	
Monſerado	06	05		09	20W	
Cape Palmos	04	03		05	36W	
Jaques Jaques	04	16	North Latitude	02	30W	
Aſſene	04	15		01	00W	
Cape three Points	04	13		00	45	
River Volta	05	40		03	30	
River Formoſa	07	00		07	40	
Cape Formoſa	04	40		08	00	
New Callabar	04	12		10	25	Eaſt Longitude
Old Callabar	03	18		11	32	
River Camerones	04	02		13	10	
River de Angra	00	49		13	15	
Lopas	01	05	S	12	20	
River Congo	05	45	S	15	25	
Angola	08	51	S	15	56	
Cape Negro	16	08	S	14	46	
Cape St. Thomas	23	10	S	14	23	
Seccos	28	56	S	15	32	
C. Bona Eſperance	34	25	S	17	25	
The Weſtern Iſlands.						
Corvo	40	05	North Latitude.	29	55	Weſt Longitude.
Flores	39	40		29	50	
Fyal	38	53		27	16	
Pico	38	32		26	31	
St. George	38	56		26	10	
Tercera	38	53		24	42	
St. Michael	38	00		22	22	
St. Maries	37	00		22	17	
Canary Iſlands.						
Ferro	28	00		18	12	
Palma	28	50	North Latitude.	18	00	Weſt Longitude.
Gomero	28	08		17	26	
Teneriff	28	20		16	45	
W. end Madera	32	17		17	22	
Porto Sancto	32	50		15	50	
Canaria	27	56		15	30	
Fortaventura	27	54		13	24	
Lancerota	28	32		12	54	

Places Names.	Latitude			Longit.		
Cape *de Verd Iſlands*	D.	M.		D.	M.	
St. Antonio	17	10		25	20	
St. Vincent	16	55		25	10	
St. Lucia	16	45	North Latitude	24	58	Weſt Longitude.
St. Nicholas	16	40		24	22	
Brava	14	35		24	38	
Fuogo	14	42		24	00	
Jago	15	20		23	10	
Iſle of May	15	16		22	12	
Iſle de Sal	16	45		22	02	
Bonaviſta	16	05		21	55	
The *Southern Iſlands.*						
St. Mathews	01	40	S	03	55W	
Aſcenſion	08	10	S	12	35W	
St. Hellena	16	06	S	05	40W	
Fernando	02	25N		11	55E	
Princeps	01	25N		11	00E	
St. Thomas	00	00		09	58E	
Annabona	01	22	S	09	28E	
Places in the *Eaſt-Indies.*						
Cape Lagullas	35	35S		18	40	
Cape Corientes	23	52S		35	35	
Moſambique	15	05S		40	30	
River de Fugas*	00	00		41	15	
Cape Baſſos	04	00		49	50	
Cape Guardafoy	11	50		52	30	Eaſt Longitude.
Cape Roſulgat	22	27		60	45	
Cape Muca	26	56		57	10	
Buſſera	30	00	North Latitude.	49	05	
Surrat	21	08		73	25	
Goa	15	22		74	37	
Callecut	11	17		75	54	
Cape Comerine	07	50		78	25	
Fort St. George	13	08		81	42	
Due Point	15	50		82	05	
Viſegapatam	17	40		85	07	
Cape Palmiras	20	45		88	10	
Bengal	22	27		91	49	

Places Names.	Latitude			Longit.		
Places in *E. Indies*	D.	M.		D.	M.	
Cape Negrais ——	26	23		93	05	
Mallacca ——	20	25		103	20	
Siam Entrance ——	13	10		101	01	
Cambodia Entrance	10	30		105	20	
Cochin ——	18	25		103	58	
Canton ——	23	30		113	20	
Amoy ——	24	35		116	55	
S. end Madagaſcar	26	06	North Latitude.	46	20	
N. end Madagaſcar	12	10		50	10	
Mayetta ——	13	10		45	45	
Mohilla ——	12	15		43	41	
Comero ——	11	50		43	45	
St. Juan de Nova	17	30		42	35	
Mauritius ——	20	05		55	05	
Digo Royes ——	19	45		61	35	
Rom de Caſtelamos	29	05		66	56	
Amſterdam ——	39	50		74	24	
St. Brandon ——	16	38		64	30	East Longitude.
Digo Gratioſa ——	08	42		69	05	
Quabella ——	03	49		52	39	
Baſſos de Chagos	05	05		70	25	
Yas de Digo Rays	00	00		72	05	
N. end of Maldivia	07	05S		73	05	
S. end of Maldivia	01	00S		76	15	
Malique ——	09	00S		73	15	
Saccatra ——	12	28S		55	37	
Abdeleur ——	12	10S		54	23	
C. Gallo in Zeloan	06	07S		80	45	
Yas de Amber ——	00	00		52	30	
Andaman ——	13	00N		91	25	
Nicobor ——	07	05N		92	55	
N. W. end Sumatra	05	28N		93	45	
Verkins Iſland ——	02	22N		94	07	
Naſſau Iſland ——	02	44S		98	32	
Bencola ——	03	50S		101	13	
S.E. end of Sumatra	05	42S		104	04	
Engano ——	05	40S		100	53	
Selam ——	08	20S		102	13	
Princes Iſland ——	06	30S		104	02	
Bantam ——	05	47S		105	11	
Batavia ——	05	37S		106	27	

Places Names	Latitude			Longit.		
	D.	M.		D.	M.	
Straits of Sundy	05	52S		104	18	
Banca South End	03	25S		106	37	
S. point of Borneo	04	14S		112	52	
Bandy Iſles ——	05	05S		126	37	
S. end of the Celebes	06	00S		117	27	East Longitude.
N. end of the Celebes	01	40		121	30	
W. Point Mindano	06	30		118	35	
N. Point of Borneo	07	10	North Latitude.	112	45	
S. Point of Luconio	12	30		120	50	
N E. Point Luconio	18	35		109	05	
W. Point of Anain	19	30		108	06	
E. Point of Anain	19	55		111	16	
S. Point of Formoſa	22	00		119	30	
N. Point of Formoſa	25	32		120	25	
Piſcadore Iſles ——	23	30		117	35	
Chuſan Iſles ——	30	38		120	35	
Places in the *South Sea.*						
Cape St. Sebaſtian	42	30		129	55	
Cape St. Lucia ——	23	25	North Latitude	111	55	
Cape Corientes ——	19	40		110	30	
Aquapulco ——	17	00		106	28	
Aquatulco ——	15	27		101	03	
Guatimala ——	14	25		96	00	West Longitude.
Panama ——	08	56		82	18	
Bonaventura Bay	03	28		80	06	
Iſland Gallopego	00	—		90	10	
Cape del Ajugo	16	38		88	50	
Cima ——	12	30	South Latitude.	73	30	
Arica ——	18	12		74	10	
La Serena ——	24	40		76	32	
I. Juan Ferdinando	33	20		86	48	
Baldivia ——	39	35		81	20	
Port Steven ——	46	50		82	36	
Cape Victory ——	52	15		83	20	
Cape Horn ——	57	58		79	55	

On

Places Names	Latitude D.	M.		Longit. D.	M.	
On the E. Continent of *America.*						
E. Entr. of Magellan	51	58		75	30	
River Julian —	48	40		74	32	
Cape Blanco —	46	50		72	05	
Buenos Aries R. Plata	36	10		57	30	
River Grand —	31	55	South Latitude	51	40	
St. Katherines	28	00		47	50	
Cape Frio —	23	10		42	56	
Spirito Sancto —	19	58		4	00	
Point Segura —	16	22		40	58	
Todus Sanctus Bay	13	00		40	35	Weſt Longitude
River St. Franciſco	10	55		37	40	
Cape St. Auguſtine	08	05		35	38	
Cape Roque —	05	00		35	52	
Triſtande Cunna	37	05		15	38	
Trinidada —	00	30		30	00	
River Amazones	00	00		49	00	
North Cape —	02	05		49	55	
Suranam —	06	00		56	55	
Oronoque —	08	15	North Latitude.	59	05	
Cape Coquibaca	12	50		70	40	
Carthagena —	10	50		75	40	
Scots Settlement —	08	30		78	45	
Nicaraque River	11	15		85	05	
Cape Catocha —	21	22		88	55	
Campeche —	19	20		93	05	
La vera Cruz —	19	15		100	25	
Cape Florida —	24	48		81	55	

The *Caribbee Iſlands.*

Places Names	Latitude D.	M.		Longit. D.	M.	
Trinadada —	10	05	North Latitude	60	05	Weſt Longitude
Tobago —	11	10		59	20	
Granado —	12	07		60	30	
Barbadoes —	13	10		58	03	
St. Vincent —	13	12		59	22	
St. Lucia —	13	52		59	17	
Martinico —	14	48		58	25	
Dominico —	15	35		58	27	
Marigallante —	15	53		58	20	
Guardalupa —	16	15		59	23	
Monſerat —	16	40		59	35	
Antegoa —	17	00		59	21	
Nevis —	17	06		60	18	
St. Ohriſtophers	17	22		60	35	
Barbuda —	17	43	North Latitude.	59	25	Weſt Longitude.
St. Bartholomew	17	54		60	45	
St. Martin —	18	05		60	49	
Anguilla —	18	13		60	55	
Virgins —	18	23		62	22	
St. Cruz —	17	38		62	35	
Brieque —	18	00		63	15	
St. Johns, Port Rico	18	33		64	20	
Santa Domingo	18	15		68	50	
Port Royal —	18	00		77	03	
Eaſt End of Cuba	20	20		74	05	
Havana —	22	50		83	30	
Honda Bay —	22	35		84	40	
Cape St. Antonia	21	50		86	32	

The *Bahama Iſlands.*

Places Names	Latitude D.	M.		Longit. D.	M.	
Bermudus —	32	30		61	30	
N. Pt. Bahama Bank	28	22		78	15	
Bahama Iſland —	27	05		78	58	
S. Point of Abacco	25	50		77	20	
Harbour Iſland —	25	40	North Latitude.	76	35	Weſt Longitude.
North Pt. Androſs	25	15		79	00	
Providence —	25	00		77	45	
South Pt. Illathera	24	30		76	12	
Cat Iſland —	24	25		75	20	
Watling Iſland —	24	07		74	50	
Rum Key —	23	45		75	05	
Exuma —	23	25		76	07	
N. P. Crooked Iſle	23	03		74	00	
Atkins Key —	22	00		74	15	
Merapervouz —	21	57		74	40	

Places Names.	Latitude		Longit.	
Bahama Iſlands.	D.	M.	D.	M.
	North Latitude.		Weſt Longitude.	
Atwoods Key	23	09	73	30
French Keys	22	40	73	35
Maaguana	22	35	73	00
Hogſties	21	15	73	50
Hyneago	20	57	73	20
N. Pt. Cancos Bank	21	50	71	15
Turks Iſland	21	35	70	08
Abrolho N. Point	21	40	68	40
Plate wrack	20	03	68	10
Places on the Coaſt of *North America*				
	North Latitude.		Weſt Longitude.	
Cha. Town Aſhly R.	32	40	78	50
Cape Hateras	35	10	74	25
Cape Henry	47	00	74	30
Cape Charles	37	14	74	15
Cape Hinlopen	39	04	73	25
Long Iſland	40	50	70	40
New York	41	00	72	05
Cape Cod	42	10	67	45
Boſton	42	35	68	55
Cape Sable	43	45	63	25
Sable Iſland	44	30	59	05
Cape Britain	46	20	58	15
Quebeck	47	05	69	50
Breſt Bay	52	10	55	00
Bell Iſland	52	05	54	10
Cape St. John	50	09	52	35
Cape Bonaviſta	49	11	52	03
Trinity Bay	48	27	54	55
Conception Bay	47	53	54	10
St. John's Harbour	47	28	53	55
Bay Bulls	47	40	54	46
Cape Race	46	30	53	25
Cape St. Mary	47	10	53	20
Placentia	47	57	55	00
Cape Roy	48	21	57	15
Suttons Iſle	60	05	69	50

Places Names.	Latitude		Longit.	
In *Hudſons Bay* and *Straits.*	D.	M.	D.	M.
	North Latitude.		Weſt Longitude.	
Cape Charles	62	35	75	20
Cape Walſingham	63	05	77	40
Mansfield Iſland	62	20	75	30
Cape Ionet	55	03	78	15
Ruperts River	51	16	78	55
Albany River	52	32	83	05
The Cubbs	54	15	82	50
C. Henrietta Maria	55	05	83	02
Port Mehon	57	05	92	50
Cape Churchill	59	00	92	57
Cape Southampton	61	57	88	30
Shark point	64	27	83	20
Nottingham Iſland	63	38	79	47
Q. Anns Foreland	63	32	74	51
Reſolution Iſland	61	55	64	50
Cape Farewell	59	10	46	45
Places in the *Northern Ocean*				
	North Latitude.		Eaſt Longitude.	
Sound Royal	66	22	14	15
Bargazar Point	66	30	11	12
Whales Back	65	27	10	05
Merchants Foreland	63	20	14	05
Halliford	64	30	24	15
Fair Foreland	65	10	26	45
Grims Iſland	66	51	17	45
Weſtmania Iſles	63	55	18	10
Iſles of Fero	62	06	05	00
John Main's Iſland	71	45	04	30
Point Lookout	76	40	16	25
Horn Sound	77	23	14	20
Fair Foreland	79	18	10	50
Haclaits Headland	79	55	12	00
Helies Sound	79	15	12	05
Lees Foreland	78	05	23	25
Whales Head	77	18	21	30
Hope Iſland	76	22	22	00
Cherry Iſle	74	35	18	05
Admiralty Iſland	75	05	59	50

Fretum

Places Names.	Latitude North Latitude.		Longit. East Longitude.	
	D.	M.	D.	M.
Places in the *Northern Ocean.*				
Fretumborough	69	55	62	05
Cape Candenoſe	69	27	42	30
Catnoſe	65	43	35	14
Archangel Bar	65	05	35	30
Croſs Iſland	66	31	36	33
Sweetnoſe	68	08	34	42
Kilduyn	69	32	30	15
North Cape	71	25	22	00
Surroy	71	05	16	40
Tromſound	70	18	16	00
S.W. point Loofort	67	47	09	35
Dronton	64	00	10	40
Standland	62	10	04	38
Northbergen	60	16	05	40
Naze of Norway	57	50	07	22
Places in the *Baltick Sea.*				
Mordon	58	25N	09	05E
Latwick	58	54N	09	20E
Chriſtiana	59	10N	09	45E
Maeſterland	57	58	11	45
Gottenbergh	57	33	12	25
Elſinore	56	00	12	32
Copenhagen	55	44	12	35
Valſterboon	55	40	12	55
Kalmer	56	40	16	40
Stockholm	59	20	18	25
Wybourg	60	20	29	26
Petersberg	59	25	29	50
Narve	58	39	28	14
Revel	59	00	24	45
Riga	56	50	24	50
Derwinda	57	20	22	00
Coningsberg	55	00	20	30
Dantzick	54	22	19	00
Wisby in Gotland	57	37	18	50
Bornholm	55	27	14	33
Straelſound	54	45	13	20
Lubeck	54	25	11	05
Anout	56	42	10	58
Leſou	57	05	10	40
Scaw	57	26	10	10

This Table is ſo eaſy to be underſtood it needs no Explanation, I ſhall now illuſtrate its Uſe with ſome Examples.

Exmaple 1.

What is the Difference of Latitude and the Difference of Longitude between the *Lizard* and Cape *Finiſter?*

Lizard Latitude	49 : 55 North	Longitude 05 : 14 Weſt
Cape *Finiſter* Latitude	43 : 06 North	Longitude 10 : 00 Weſt
	5 : 49	4 : 46
	60	60
Diff. of Latitude is	349 South.	Diff. of Longitude is 286 Weſt

This is plain from the *Problem* 6, 7, 10. of *Plain Sailing.*

Example 2.

A Ship from the *Scaw*, in the Latitude of 56 : 27 North, and Longitude of 10 : 10 Eaſt, ſails till ſhe hath altered her Latitude 2 : 10 South, and her Longitude 2 : 15 Weſt, what is her Latitude and Longitude come into?

Latitude come from 57 : 26N. Longitude come from 10 : 10 Eaſt
Diff. of Latitude 2 : 10S. Diff. of Longitude 2 : 15 Weſt

Latitude come into 55 : 16 N. Longitude come into 7 : 55 Eaſt

This is all plain from the *Problems* 8, 9, of *Plain Sailing*.

Now the following *Problems* only peculiar to this Sailing, we will take in Order.

PROBLEM I.

To find the middle Latitude between any two Places or given Latitudes.

Rule. If both the Places are on the ſame ſide of the Equinoctial, half their Sum is the middle Latitude between them.

But, if the two Places are on different ſides the Equinoctial, half their Difference is the middle Latitude between them.

Example 1.

What is the middle Latitude between 40 : 50 N. *Example* 2. 44 : 13 S.
26 : 24 N. 20 : 15 S.

The Sum of the Latitudes 67 : 16 64 : 28

The ½ Sum of the Lat. or middle Lat. 33 : 38 required 32 : 14 req.

Example 3. What is the middle Latitude between 22 : 18 South
36 : 12 North.

The Difference of the Latitudes is 13 : 54.

Half the Difference, or middle Latitude is 6 : 57 required.

PROBLEM II.

The middle Latitude and Departure, or Meridian Diſtance given, to find the Difference of Longitude.

Rule. Find the middle Latitude at the Head or Foot of the Traverſe Table, and the Departure in the Difference of Latitude Column, the Diſtance anſwering thereto, is the Difference of Longitude required.

Example 1. Middle Latitude 33 : 45, Departure 38 : 02, what is the Difference of Longitude?

Anſwer, The Difference of Longitude is 46 Miles.

Example 2. Middle Latitude 36 : 34, Departure 74 : 8, what is the Difference of Longitude? *Anſwer* 93 Miles.

Example 3. Middle Latitude 50 : 37, Departure 30.4 Miles, what is the Difference of Longitude ? *Anſwer*, 48 Miles.

Example 4. Middle Latitude 53 : 26, Departure 57.3 Miles, what is the Difference of Longitude ? *Anſwep*, 96 Miles.

Example 5. Middle Latitude 39 : 22, Departure 294 Miles, what is the Difference of Longitude ? *Anſwer*, 380 Miles.

Example 6. Middle Latitude 42 : 11, Departure 280 Miles, what is the Difference of Longitude ? *Anſwer*, 378 Miles.

Example 7. Middle Latitude 47 : 49 Departure 174 Miles, what is the Difference of Longitude ? *Anſwer*, 260 Miles.

Example 8. Middle Latitude 56 : 15, Departure 104 Miles, what is the Difference of Longitude ? *Anſwer*, 187 Miles.

Note, If the Departure is Eaſt, the Difference of Longitude is Eaſt ; when the Departure is Weſt, the Difference of Longitude is Weſt.

PROBLEM III.

The middle Latitude and Difference of Longitude given, to find the Departure, or Meridian Diſtance.

Rule. Find the middle Latitude at the Head or Foot of the Traverſe Table, and the Difference of Longitude in the Diſtance Column, the Difference of Latitude anſwering thereto, is the Meridian Diſtance required.

Example 1. Middle Latitude 39 : 22, Difference of Longitude 44 Miles, what is the Meridian Diſtance ? *Anſwer*, 34 Miles.

Example 2. Middle Latitude 42 : 11, Difference of Longitude 86 Miles, what is the Meridian Diſtance ? *Anſwer*, 64 Miles.

Example 3. Middle Latitude 36 : 34, Difference of Longitude 480 Miles, what is the Meridian Diſtance, *Anſwer*, 286 Miles.

Example 4. Middle Latitude 39 : 22, Difference of Longitude 987 Miles, what is the Meridian Diſtance ? *Anſwer*, 627 Miles.

Note, This *Problem* is the Reverſe of the foregoing ; therefore he that underſtands the one muſt the other ; and therefore we need not here uſe any *Examples*, where the middle Latitude is at the Foot of the Traverſe Table, that being ſufficiently exemplified in the preceeding *Problem*.

PROBLEM IV.

The Latitude and Longitude come from, with the Courſe and Diſtance made good ſince given, to find the Latitude and Longitude come into.

Rule. With the given Courſe and Diſtance, find the Difference of Latitude and Departure, by *Problem* 1 *of Plain Sailing*.

With the Latitude come from, and the Difference of Latitude now found, find the Latitude come into, by *Problem* 8 *of Plain Sailing*.

Find the middle Latitude between the Latitude come from and the Latitude come into, by *Problem* 1. *of Mercator Sailing*.

With this Middle Latitude and Departure before found, find the Difference of Longitude, by *Poblerm* 2. *of Mercator's Sailing*.

With the Longitude come from, and this Difference of Longitude, find the Longitude come into, by *Prob. 9. of Plain Sailing.*

Example.

A Ship from the Latitude of 48 : 15 North, and Longitude 14 : 14 W. ſails N E by N. 152 Miles, what is her Latitude and Longitude come into?

The Operation.

The Latitude come from 48 : 15 N. Long. 14 ; 14 W.
Courſe NE by N. Diſt. 152 Miles, Diff. Lat. is 2 : 07 N. Dep. 84.1 Miles.

Latitude come into is 50 : 22 North

The Sum of the Latitudes is 98 : 37

The middle Latitude is 49 : 18 Diff. Long. 02;09 E.

The Longitude come into is 12:05 W.

Note, This *Problem* may be exemplified in all the Caſes of *Problem 3. of Plain Sailing,* which I think will be needleſs, becauſe the moſt ignorant may comprehend it, by what I have there ſaid; let us now proceed to

PROBLEM V.

The Latitudes and Longitudes of two Places given, to find their Bearings and Diſtance aſunder.

Rule. Find the Difference of Latitude, the Difference of Longitude, and the middle Latitude between them, by *Prob.* 6, 7, 10. *of Plain Sailing,* and *Prob.* 1. *of Mercator.*

With the middle Latitude and this Difference of Longitude, find the Meridian Diſtance between them, by *Problem 3. of Mercator Sailing.*

With the Difference of Latitude before found, and the Meridian Diſtance laſt found, find their Bearings and Diſtance aſunder, by *Problem 2. of Plain Sailing.*

Example.

A Ship from the Latitude of 48 : 50 North, and Longitude of 18 : 20 Weſt, is bound to a Port, in the Latitude of 40 : 10 North, and Longitude of 8 : 17 Weſt, what Courſe and Diſtance muſt ſhe make good to fetch her Port?

The Operation.

The Latitude come from is 48 : 50 N. the Longitude 18 : 20 Weſt
The Latitude bound to is 40 : 10 N. the Longitude 8 : 17 Weſt
The Difference of Latitude is 8 : 40 S. the Diff. Long. 10 ; 03 Eaſt
60 60
which in Miles is 520 S. and 603 Miles Eaſt
The Sum of the Latitudes 89 : 00
The middle Latitude is 44 : 30, and the Difference of Longitude 603 Miles Eaſt, therefore her Meridian Diſtance muſt be 429 Miles Eaſt, and her Difference of Latitude is 520 Miles South, therefore her Port bears S. E. by S. half E. Diſtance 674 Miles.

PROBLEM VI.

The Latitude and Longitude come from, with the Latitude and Longitude bound to, and the Courſe and Diſtance run ſince given, to find the Latitude and Longitude come into, and the Bearings and Diſtance to her Port.

Rule. Find her Latitude and Longitude come into, by *Prob.* 4. *of Mercator's Sailing*, find the Bearings and Diſtances to her Port, by *Prob.* 5. *Mercator's Sailing.*

Example. A Ship from the Latitude of 46 : 54 North, and Longitude of 12 : 20 Weſt, is bound to a Port in the Latitude of 32 : 10 North, and Longitude of 2 : 10 Eaſt, ſhe ſails S.E. 182 Miles, what is her Latitude and Longitude come into, and the Bearings and Diſtance to her Port.

The Operation.

Latitude come from 46 : 54 North, Longitude 12 : 20 Weſt
S. E. 182 Miles, Diff. Latitude 2 : 08 South, the Departure 128.4 Miles.

The Latitude come into is 44 : 46 North

The Sum of the Latitudes is 91 : 40

The middle Latitude is 45 : 50
And the Departure being 128.4 Miles, gives the Diff. of Long. 03 : 3 Eaſt
Therefore the Longitude come into is 9 : 17 W.

The Latitude bound to is 32 : 10 N. the Longitude 2 : 10 E.

The Dif. Lat. to make is 12 : 36 S. the Dif. Longitude 11 : 27 E.
60 60

Reduced into Miles is 756 South and 687 Miles E

The Sum of the Latitude come into, and bound to is 76 : 56, therefore the half or middle Latitude is 38 : 28, which with the Difference of Longitude 687 Miles Eaſt, ſhews her Meridian Diſtance is 540 Miles Eaſt, to make, and 756 Miles South Difference of Latitude to make, ſhews her Port bears S. 33 : 09 E. Diſtance 936 Miles.

Note, This *Problem* may be exemplified by all the Caſes of *Problem* 3. *of Plain Sailing*; which will have no other Alteration than by what we have there done, to find the Ships true Courſe, Diſtance, Difference of Latitude, and Departure, and then proceed as in the Operation above.

This *Problem* contains the whole Art of *Navigation*; but ſince the Operation may be more Conciſe than in this *Example*, and lye more ready in any Part of a Voyage to anſwer what Properties are required, we will give a Type or Synopſis of it, as in the following Table, with an Explanation thereof, which is a Run from the *Lizard* of *England*, towards the Coaſt of *Portugal*.

W. D.	M. D.	Courſe.	Diſtance.	Diff. Lat.		Departure		Latit. come into.	Sum of the Latit.	Half Sum of Latit.
				N.	S.	E.	W.			
Bound	from	the *Lizard.*						49:55N.		
♄	22	S W by S.	50		41.6		27.8	49:13N.	99:08	49:34
☉	23	S. W. ¼ W.	74		49.7		54.8	48:23N.	97:36	48:48
☽	24	S. W. half S.	100		77.3		63.4	47:06N.	95:29	47:44
♂	25	W S W. ½ W.	62		18.0		59.3	46:48N.	94:54	47:27
☿	26	SSW ¾ W.	69		59.2		35.5	45:49N.	92:37	46:18
♃	27	S. 3 quart. W	44		43.5	6.5		45:05N.	90:54	45:27
♀	28	S W by S.	72		59.8		40.0	44:05N.	89:10	44:35
♄	1	N. 80:30 W.	36	6.0			35.5	44:11N.	88:16	44:08
☉	2	S 13:00 E.	25		43.3	5.6		43:47N.	87:58	43:59

The nine firſt Columns are the ſame as in Page 65, the tenth Column i the Sum of the Latitudes, *viz.* of the Latitude you are now in, and the Latitude you were in the Noon before, the eleventh is the middle Latitude, or half the foregoing Column, in the twelfth is the Difference of Longitude, which is got by the middle Latitude and the Departure, in the ſeventh o eighth Columns; in the thirteenth is the Longitude from *London*, which is got by the Difference of Longitude and the Longitude you were in the Noon before. Theſe thirteen Columns contain the whole Operation of *Problem* 4. of *Mercator Sailing*; in the fourteenth Column is the Sum of the Latitudes, *viz.* of the Latitude you are now in, and the Latitude of the Place whoſe Bearings you want, in the 15th is the middle Latitude or half the foregoing Column; in the 16th is the Difference of Longitude you have to make, to the Place whoſe Bearings you want, which is got by the Difference of Longitude you had to make the Noon before, and the Difference of Longitude you have made in the 24 Hours; in the 17th is the Meridian Diſtance you have to make, which is got by the 15th and 16th Columns; in the 18th is the Difference of Latitude you have to make to the ſame Place, which is got by the Difference of Latitude you had to make the Day before, and the Difference of Latitude in the 5th or 6th Columns; in the 19th is the Bearings, and in the 20th is the Diſtance of the Place you in-

Diff. of Long.	*Longit. from London.*	*Sum of of the Latit.*	*Half Sum of Latit.*	*Diff. Lon. to make.*	*Mer. Diſ. to make.*	*Diff. Lat. to make.*	Cape *Finiſter.*	
							Bearings.	*Diſt.*
	5:14W	43:06N.		286W		409 S.		
43 W.	5:57W	92:19N.	46:09	243W	169W	367 S.	S. 24 : 37 W	403
83 W.	7:20W	91:29N	45:44	160W	112W	317 S.	Sby W. 3qr. W	336
94 W.	8:54W	90:12N.	45:06	66W	47W	240 S.	South by Weſt	245
87 W.	10:21W	89:54N.	44:57	21E	15 E	222 S.	S. 03 : 52 E.	223
51 W.	11:12W	88:55N.	44:27	72 E	52 E	163 S.	S. 17 : 50 E.	171
9E.	11:03W	88:11N.	44:05	63 E	46 E	119 S.	S. 21 : 06 E.	127
56 W.	12:59W	87.11N.	43:35	119 E	87 E	59 S.	S. 55 : 51 E.	106
50 W.	12:49W	87:17N.	43:38	169 E	123 E	65 S.	SE. by E. ½ E.	139
8E.	12:41W	87:53N.	43:56	161 E	117 E	41 S.	S. 70 : 40 E.	124

intend to make or avoid; which is got by the two foregoing Columns, and is all that is neceſſary towards keeping a Journal, or a true and juſt Account of the Daily run of the Ship. This may be daily kept upon half a Sheet of ſpare Paper, and only ſome of the Columns to be inſerted in your Journal, at the End of the Run, either according to the Method of the *Royal Navy*; or in your *Log-Book*, according to the *Eaſt India* and ſome *Merchant Ships* Method.

Theſe things being thoroughly known, it remains for us now to ſhew, how to find the Latitude of the Place, and the Variation of the Compaſs, by Obſervation of the Sun, which brings us to the Conſideration of ſome *Aſtronomical Problems*; and here I thought to have ſhewn you the Figure, with the Deſcription and Uſe of the *Sea Quadrant*; but as the ſeeing one or two Obſervations taken at *Sea*, will give you a greater inſight into the Nature or Method of it, than my troubling you with two or three Pages; beſides as there are ſeveral ſorts of them, I ſhall deſiſt therefrom, and at preſent only let you know, that by this Quadrant, the Sailor can always at Noon, if the Sun ſhines, tell how far he is to the Northward or Southward of the Sun, *viz.* if he looks Northward while he is taking his Obſervation at Noon, he is as many Degrees and Minutes to the Northward of the

Sun as he hath on his Quadrant; but if he looks to the Southward, he is as much to the Southward of the Sun; becauſe his Back is towards the Sun all the time of Obſervation.

Now, the Declination of the Sun, is the Diſtance of the Sun from the Equinoctial, and is North if the Sun is on the North ſide the Equinoctial; but South, when the Sun is on the South ſide of it.

The Latitude of the Place is the Diſtance of that Place from the Equinoctial, *&c.*

Now, ſince we can at Noon by the following Table, find how far the Sun is on the North or South ſide the Equinoctial, and at the ſame time, by a Quadrant, find how far we are to the Northward or Southward of the Sun, we can at that time, by Addition or Subtraction, find how far we are from the Equinoctial, and on what ſide of it, which is finding the Latitude by Obſervation.

Here follows a Table of the Suns Declination, which will be readily underſtood from

PROBLEM I.

To find when it is *Leap-Year*, or what Year after *Leap-Year*, any given Year is.

Rule. Divide the two right Hand Figures of the Date of the Year by 4, if nothing remains it is *Leap-Year*; if 1 the firſt, if 2 the ſecond, and if 3 the third Year after *Leap-Year*.

Example 1.

$\frac{1729}{4}$ 1, the firſt Year after *Leap-Year*.

Example 2.

$\frac{1730}{4}$—2, is the ſecond Year after *Leap-Year*.

Example 3.

$\frac{1731}{4}$—3, is the third Year after *Leap-Year*.

Example 4.

$\frac{1732}{4}$—0, is *Leap-Year*.

January

A Table of the Sun's Declination.

Days of the Month.	January hath XXXI Days.							
	Leap-year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declination.		*Sun's Declination.*		*Sun's Declination.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*
1	21	45 South.	21	37	21	40	21	42
2	21	35	21	27	21	30	21	32
3	21	24	21	17	21	19	21	22
4	21	14	21	06	21	04	21	11
5	21	3	20	54	20	57	0	60
6	20	51	20	42	20	45	20	48
7	20	39	20	30	20	33	0	36
8	20	27	20	18	20	21	20	24
9	20	14	20	05	20	08	20	11
10	20	01	19	51	19	55	19	58
11	19	48	19	38	19	41	19	44
12	19	34	19	24	19	27	19	30
13	19	20	19	09	19	13	19	16
14	19	05	18	54	18	58	19	02
15	18	50	18	39	18	43	18	47
16	8	35	18	24	18	28	18	31
17	18	20	18	08	18	12	18	16
18	18	04	17	51	17	56	17	60
19	17	48	17	36	17	40	17	44
20	17	31	17	19	17	23	17	27
21	17	14	17	02	17	06	17	10
22	16	57	16	44	16	49	16	53
23	16	40	16	27	16	31	16	35
24	16	22	16	09	16	13	16	18
25	16	04	15	51	15	55	15	60
26	15	46	15	32	15	36	15	41
27	15	27	15	14	15	18	15	23
28	15	08	14	55	14	59	15	04
29	14	49	14	35	14	40	14	45
30	14	30	14	16	14	21	14	25
31	14	11	13	56	14	01	14	06

Days of the Month.	February hath XXVIII Days.							
	Leap-year.		*Eirst after.*		*Second after.*		*Third after.*	
	Sun's Declination.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*
1	13	51 South	13	36	13	41	13	46
2	13	31	13	16	13	21	13	26
3	13	11	12	56	13	01	13	06
4	12	50	12	35	12	40	12	45
5	12	29	12	14	12	19	12	24
6	12	09	11	53	11	58	12	04
7	11	48	11	32	11	37	11	42
8	11	26	11	11	11	16	11	21
9	11	05	10	49	10	55	10	60
10	10	43	10	28	10	33	10	38
11	10	22	10	06	10	11	10	16
12	09	60	09	44	09	49	09	55
13	09	38	09	22	09	27	09	32
14	09	16	08	59	09	05	09	16
15	08	53	08	37	08	42	08	48
16	08	31	08	14	08	20	08	25
17	08	08	07	52	07	57	08	03
18	07	46	07	29	07	35	7	40
19	07	23	07	06	07	12	07	17
20	06	60	06	43	06	49	06	54
21	06	37	06	20	06	26	06	31
22	05	14	06	57	06	03	06	08
23	05	51	05	34	05	35	05	45
24	05	27	05	10	05	16	05	22
25	04	04	05	47	04	53	04	58
26	04	41	04	24	04	29	04	35
27	04	17	04	00	04	06	04	12
28	03	54	03	37	03	42	04	38
29	03	30						

A Table of the Sun's Declination.

Days of the Month.	March hath XXXI Days.								Days of the Months.	April hath XXX Days.							
	Leap-Year.		*First after.*		*Second after.*		*Third after.*			*Leap-Year.*		*First after.*		*Second after.*		*Third after.*	
	Sun's Declin.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Decli.*			*Sun's Declin.*		*Sun's Declin.*		*Sun's Declin.*		*Sun's Declin.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*		*D.*	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*
1	03	07 South.	03	13 South	03	16 South	03	24	1	08	52	08	46	08	41	08	35
2	02	43	02	49	02	55	03	01 South	2	09	14 North	09	08	09	03	08	57
3	02	19	02	26	02	31	02	37	3	09	35	09	29	09	24	09	19
4	01	56	02	02	02	08	02	14	4	09	57	09	51	09	46	09	41
5	01	32	01	38	01	44	01	50	5	10	18	10	12	10	07	10	02
6	01	08 S.	01	15S	01	20S	01S	26	6	10	39	10	33	10	28	10	23
7	00	45 S.	00	51S	00	57S	01S	02	7	11	00	10	54	10	49	10	44
8	00	21S.	00	27S	00	33S	00S	39	8	11	21	11	15	11	10	11	05
	0	03N	00	04S.	00	09S	00S	15	9	11	41	11	36	11	31	11	26
10	00	27N	00	20N.	00	14N.	00N.	09	10	12	02	11	56	11	51	11	46
11	00	50	00	44	00	38	00	32	11	12	22	12	16	12	12	12	07
12	01	14	01	07	01	02	00	56	12	12	42	12	36	12	32	12	27
13	01	37	01	31	01	25	01	20	13	13	02	12	56	12	52	12	47
14	02	01	01	55	01	49	01	43	14	13	21	13	16	13	11	13	06
15	02	25	02	18	02	12	02	07	15	13	41	13	35	13	31	13	26
16	02	48	02	42	02	36	02	30	16	13	60	13	54	13	50	13	45
17	03	11	03	05	02	59	02	54	17	14	19	14	13	14	09	14	04
18	03	35	03	28	03	23	03	17	18	14	37	14	32	14	28	14	23
19	3	58	03	52	03	46	03	40	19	14	56	14	51	14	46	14	42
2	04	21	04	15	04	09	04	04	20	15	14	15	09	15	04	15	00
21	04	44	04	38	04	33	04	27	21	15	32	15	27	15	22	15	18
22	05	07	05	01	04	56	04	50	22	15	49	15	45	15	40	15	36
2	05	30	05	24	05	19	05	13	23	16	07	16	02	15	58	15	54
24	05	53	05	47	05	42	05	36	24	16	24	16	19	16	15	16	11
25	06	16	06	10	06	04	05	59	25	16	41	16	36	16	32	16	28
26	06	39	06	33	06	27	06	22	26	16	57	16	53	16	49	16	45
27	07	01	06	55	06	50	06	44	27	17	14	17	02	17	05	17	01
28	07	24	07	18	07	12	07	07	28	17	30	17	25	17	21	17	17
29	7	46	07	40	07	34	07	29	29	17	45	17	41	17	37	17	33
30	08	08	08	02	07	57	07	51	30	18	01	17	57	17	53	17	49
31	08	30	08	24	08	19	08	13									

A Table of the Suns Declination.

May hath XXXI Days.									
Days of the Month	Leap-Year. Sun's Declin.			First after. Sun's Declin.		Second after. Sun's Declin.		Third after. Sun's Delin.	
	D.	M.		D.	M.	D.	M.	D.	M
1	18	16	North	18	12	18	08	18	04
2	18	31		18	27	18	23	18	19
3	18	45		18	41	18	38	18	34
4	18	59		18	56	18	52	18	49
5	19	13		19	10	19	06	19	03
6	19	27		19	28	19	20	19	17
7	19	40		19	36	19	33	19	30
8	19	53		9	49	19	46	19	43
9	20	09		20	02	19	59	19	56
10	20	18		20	14	20	11	20	09
11	20	30		20	26	20	24	20	21
12	20	41		20	38	20	35	20	32
13	20	52		20	49	20	47	20	44
14	21	03		21	00	20	58	20	55
15	21	14		21	11	21	08	21	06
16	21	24		21	21	21	18	21	16
17	21	33		21	31	21	28	21	25
18	21	43		21	40	21	38	21	36
19	21	52		21	49	21	47	21	45
20	22	00		21	58	21	56	21	54
21	22	09		22	06	22	04	22	02
22	22	16		22	14	22	12	22	10
23	22	24		22	22	22	20	22	18
24	22	31		22	29	22	27	22	25
25	22	37		22	36	22	34	22	32
26	22	44		22	42	22	41	22	39
27	22	50		22	48	22	47	22	45
28	22	55		22	54	22	52	22	51
29	23	00		22	59	22	58	22	56
30	23	05		23	04	23	02	23	01
31	23	09		23	08	23	07	23	06

June hath XXX Days.									
Days of the Month.	Leap-Year. Sun's Declin.			First after. Sun's Declin.		Second after. Sun's Declin.		Third after Sun's Delin.	
	D.	M.		D.	M.	D.	M.	D.	M
1	23	13	North	23	12	23	11	23	10
2	23	16		23	15	23	15	23	14
3	23	19		23	19	23	18	23	17
4	23	22		23	21	23	21	23	20
5	23	24		23	24	23	23	23	23
6	23	26		23	25	23	25	23	25
7	23	27		23	27	23	27	23	26
8	23	28		23	28	23	28	23	28
9	23	29		23	29	23	29	23	28
10	23	29		23	29	23	29	23	29
11	23	29		23	29	23	29	23	29
12	23	28		23	28	23	28	23	29
13	23	27		23	27	23	27	23	28
14	23	25		23	26	23	26	23	27
15	23	24		23	24	23	25	23	26
16	23	21		23	22	23	22	23	23
17	23	18		23	19	23	20	23	21
18	23	15		23	16	23	17	23	18
19	23	12		23	13	23	14	23	14
20	23	08		23	09	23	10	23	11
21	23	03		23	05	23	06	23	07
22	22	59		23	00	23	01	23	02
23	22	53		22	55	22	56	22	57
24	22	48		22	49	22	51	22	52
25	22	42		22	44	22	45	22	47
26	22	36		22	37	22	39	22	40
27	22	29		22	31	22	32	22	34
28	22	22		22	24	22	25	22	27
29	22	14		22	16	22	18	22	20
30	22	08		22	09	22	10	22	12

A Table of the Sun's Declination.

Days of the Month.	March hath XXXI Days.							
	Leap-Year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declin.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*
1	03	07 South.	03	13 South	03	16 South	03	24
2	02	43	02	49	02	55	03 South	01
3	02	19	02	26	02	31	02	37
4	01	56	02	02	02	08	02	14
5	01	32	01	38	01	44	01	50
6	01	08 S.	01	15S	01	20S	01S	26
7	00	45 S.	00	51S	00	57S	01S	02
8	00	21S.	00	27S	00	33S	00S	39
9	0	03N	00	04S.	00	09S	00S	15
10	00	27N	00	20N.	00	14N.	00N.	09
11	00	50	00	44	00	38	00	32
12	01	14	01	07	01	02	00	56
13	01	37	01	31	01	25	01	20
14	02	01	01	55	01	49	01	43
15	02	25	02	18	02	12	02	07
16	02	48	02	42	02	36	02	30
17	03	11	03	05	02	59	02	54
18	03	35	03	28	03	23	03	17
19	3	58	03	52	03	46	03	40
20	04	21	04	15	04	09	04	04
21	04	44	04	38	04	33	04	27
22	05	07	05	01	04	56	04	50
23	05	30	05	24	05	19	05	13
24	05	53	05	47	05	42	05	36
25	06	16	06	10	06	04	05	59
26	06	39	06	33	06	27	06	22
27	07	01	06	55	06	50	06	44
28	07	24	07	18	07	12	07	07
29	7	46	07	40	07	34	07	29
30	08	08	08	02	07	57	07	51
31	08	30	08	24	08	19	08	13

Days of the Months.	April hath XXX Days.							
	Leap-Year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declin.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Declin.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*
1	08	52	08	46	08	41	08	35
2	09	14 North	09	08	09	03	08	57
3	09	35	09	29	09	24	09	19
4	09	57	09	51	09	46	09	41
5	10	18	10	12	10	07	10	02
6	10	39	10	33	10	28	10	23
7	11	00	10	54	10	49	10	44
8	11	21	11	15	11	10	11	05
9	11	41	11	36	11	31	11	26
10	12	02	11	56	11	51	11	46
11	12	22	12	16	12	12	12	07
12	12	42	12	36	12	32	12	27
13	13	02	12	56	12	52	12	47
14	13	21	13	16	13	11	13	06
15	13	41	13	35	13	31	13	26
16	13	60	13	54	13	50	13	45
17	14	19	14	13	14	09	14	04
18	14	37	14	32	14	28	14	23
19	14	56	14	51	14	46	14	42
20	15	14	15	09	15	04	15	00
21	15	32	15	27	15	22	15	18
22	15	49	15	45	15	40	15	36
23	16	07	16	02	15	58	15	54
24	16	24	16	19	16	15	16	11
25	16	41	16	36	16	32	16	28
26	16	57	16	53	16	49	16	45
27	17	14	17	02	17	05	17	01
28	17	30	17	25	17	21	17	17
29	17	45	17	41	17	37	17	33
30	18	01	17	57	17	53	17	49

A Table of the Suns Declination.

Days of the Months	May hath XXXI Days.								Days of the Month.	June hath XXX Days.							
	Leap-Year. *Sun's Declin.*		*First after.* *Sun's Declin.*		*Second after.* *Sun's Declin.*		*Third after.* *Sun's Delin.*			*Leap-Year.* *Sun's Declin.*		*First after.* *Sun's Declin.*		*Second after.* *Sun's Declin.*		*Third after* *Sun's Delin.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*		*D.*	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*
1	18	16 North	18	12	18	08	18	04	1	23	13 North	23	12	23	11	23	10
2	18	31	18	27	18	23	18	19	2	23	16	23	15	23	15	23	14
3	18	45	18	41	18	38	18	34	3	23	19	23	19	23	18	23	17
4	18	59	18	56	18	52	18	49	4	23	22	23	21	23	21	23	20
5	19	13	19	10	19	06	19	03	5	23	24	23	24	23	23	23	23
6	19	27	19	28	19	20	19	17	6	23	26	23	25	23	25	23	25
7	19	40	19	36	19	33	19	30	7	23	27	23	27	23	27	23	26
8	19	53	9	49	19	46	19	43	8	23	28	23	28	23	28	23	28
9	20	09	20	02	19	59	19	56	9	23	29	23	29	23	29	23	28
10	20	18	20	14	20	11	20	09	10	23	29	23	29	23	29	23	29
11	20	30	20	26	20	24	20	21	11	23	29	23	29	23	29	23	29
12	20	41	20	38	20	35	20	32	12	23	28	23	28	23	28	23	29
13	20	52	20	49	20	47	20	44	13	23	27	23	27	23	27	23	28
14	21	03	21	00	20	58	20	55	14	23	25	23	26	23	26	23	27
15	21	14	21	11	21	08	21	06	15	23	24	23	24	23	25	23	26
16	21	24	21	21	21	18	21	16	16	23	21	23	22	23	22	23	23
17	21	33	21	31	21	28	21	25	17	23	18	23	19	23	20	23	21
18	21	43	21	40	21	38	21	36	18	23	15	23	16	23	17	23	18
19	21	52	21	49	21	47	21	45	19	23	12	23	13	23	14	23	14
20	22	00	21	58	21	56	21	54	20	23	08	23	09	23	10	23	11
21	22	09	22	06	22	04	22	02	21	23	03	23	05	23	06	23	07
22	22	16	22	14	22	12	22	10	22	22	59	23	00	23	01	23	02
23	22	24	22	22	22	20	22	18	23	22	53	22	55	22	56	22	57
24	22	31	22	29	22	27	22	25	24	22	48	22	49	22	51	22	52
25	22	37	22	36	22	34	22	32	25	22	42	22	44	22	45	22	47
26	22	44	22	42	22	41	22	39	26	22	36	22	37	22	39	22	40
27	22	50	22	48	22	47	22	45	27	22	29	22	31	22	32	22	34
28	22	55	22	54	22	52	22	51	28	22	22	22	24	22	25	22	27
29	23	00	22	59	22	58	22	56	29	22	14	22	16	22	18	22	20
30	23	05	23	04	23	02	23	01	30	22	08	22	09	22	10	22	12
31	23	09	23	08	23	07	23	06									

A Table of the Suns Declination.

Days of the Months	July hath XXXI Days.							
	Leap-Year.		First after.		Second after..		Third after.	
	Sun's Declin.		Sun's Declin.		Sun's Declin.		Sun's Delin.	
	D.	M.	D.	M.	D.	M.	D.	M
1	21	58 North	22	00	22	02	22	04
2	21	49	21	52	21	54	21	56
3	21	40	21	43	21	45	21	47
4	21	31	21	34	21	36	21	38
5	21	21	21	24	21	26	21	29
6	21	11	21	14	21	16	21	19
7	21	00	21	03	21	06	21	08
8	20	50	20	53	20	55	20	58
9	20	38	20	42	20	44	20	47
10	20	27	20	30	20	33	20	36
11	20	15	20	18	20	21	20	24
12	20	03	20	06	20	09	20	12
13	19	50	19	54	19	57	20	00
14	19	37	19	41	19	44	19	47
15	19	24	9	28	19	31	19	34
16	19	11	19	14	19	18	19	21
17	18	57	19	00	19	04	19	07
18	18	42	18	46	18	50	18	53
19	18	28	18	32	18	35	18	39
20	18	13	18	17	18	21	18	24
21	17	58	18	02	18	06	18	10
22	17	43	17	47	17	51	17	54
23	17	27	17	31	17	35	17	39
24	17	11	17	15	17	19	17	23
25	16	55	16	59	17	03	17	07
26	16	38	16	43	16	47	16	51
27	16	22	16	26	16	30	16	34
28	16	05	16	09	16	13	16	17
29	15	47	15	52	15	56	16	00
30	15	30	15	35	15	39	15	43
31	15	12	15	17	15	21	15	25

Days of the Month	August hath XXXI Days.							
	Leap-Year..		First after.		Second after.		Third after	
	Sun's Delin.		Sun's Declin.		Sun's Declin.		Sun's Delin.	
	D.	M.	D.	M.	D.	M.	D.	M
1	14	54 North	14	59	15	03	15	07
2	14	36	14	41	14	45	14	49
3	14	17	14	22	14	27	14	31
4	13	58	14	03	14	08	14	12
5	13	39	13	44	13	49	13	54
6	13	20	13	25	13	30	13	35
7	13	01	13	06	13	11	13	15
8	12	41	12	46	12	51	12	56
9	12	21	12	27	12	31	12	36
10	12	01	12	07	12	12	13	16
11	11	41	11	47	11	51	11	56
12	11	21	11	26	11	31	11	36
13	11	00	11	06	11	11	11	16
14	10	39	10	45	10	50	10	55
15	10	18	10	24	10	29	10	34
16	09	57	10	03	10	08	10	13
17	9	36	09	42	09	47	09	52
18	09	15	09	21	09	26	09	31
19	08	53	08	59	09	04	09	09
20	08	31	08	27	08	43	08	48
21	08	10	08	16	08	21	08	26
22	07	48	07	54	07	59	08	04
23	07	26	07	32	07	37	07	42
24	07	03	07	05	07	15	07	20
25	06	41	06	47	06	53	06	58
26	06	19	06	25	06	30	06	36
27	05	56	06	02	06	08	06	13
28	05	33	05	40	05	45	05	51
29	05	11	05	17	05	22	05	28
30	04	48	04	54	05	00	05	05
31	04	25	04	31	04	37	04	42

A Table of the Sun's Declination.

Days of the Month.	September hath XXX Days.							
	Leap-Year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declin.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*
1	04	02 North	04	08 North	04	14 North	04	19 North
2	03	39	03	45	03	51	03	56
3	03	16	03	22	03	28	03	33
4	02	53	02	59	03	05	03	10
5	02	29	02	36	02	41	02	47
6	02	06	02	13	02	18	02	24
7	01	43	01	49	01	55	02	01
8	01	19	01	26	01	32	01	37
9	00	56	01	02	01	08	01	14
10	00	32	00	35	00	45	00	50
11	00	09 N.	00	16 N.	00	21 N	00 N.	27
12	00	14 South	00	08 South	00	02 South	00 N.	04
13	00	38	00	31	00	26	00 South	20
14	01	01	00	55	00	49	00	43
15	01	25	01	18	01	13	01	07
16	01	48	01	42	01	36	01	30
17	02	12	02	05	02	00	01	54
18	02	35	02	29	02	23	02	17
19	02	58	02	52	02	46	02	41
20	03	22	03	15	03	10	03	04
21	03	45	03	39	03	33	03	28
22	04	08	04	02	03	56	03	51
23	04	32	04	25	04	20	04	14
24	04	55	04	49	04	43	04	37
25	05	18	05	12	05	06	05	01
26	05	41	05	15	05	29	05	24
27	06	04	05	53	05	52	05	47
28	06	27	06	21	06	15	06	10
29	06	50	06	44	06	38	06	33
30	07	13	07	06	07	01	06	55

Days of the Month.	October hath XXXI Days.							
	Leap-Year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declin.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Declin.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M.*
1	07	35 South.	07	29	07	24	07	18
2	07	58	07	52	07	46	07	41
3	08	20	08	14	08	09	08	03
4	08	43	08	36	08	31	08	26
5	09	05	08	59	08	53	08	48
6	09	27	09	21	09	15	09	10
7	09	49	09	43	09	37	09	32
8	10	10	10	05	09	59	09	54
9	10	32	10	26	10	21	10	16
10	10	54	10	48	10	42	10	37
11	11	15	11	09	11	04	10	29
12	11	36	11	30	11	25	11	20
13	11	57	11	51	11	46	11	41
14	12	13	12	12	12	07	12	02
15	12	38	12	33	12	28	12	23
16	12	59	12	53	12	48	12	43
17	13	19	13	13	13	08	13	04
18	13	39	13	33	13	29	13	24
19	13	58	13	53	13	48	13	44
20	14	38	14	13	14	08	14	03
21	14	37	14	32	14	27	14	23
22	14	56	14	51	14	47	14	42
23	15	15	15	10	15	06	15	01
24	15	34	15	29	15	24	15	20
25	15	52	15	47	15	43	15	38
26	16	10	16	05	16	01	15	57
27	16	28	16	23	16	19	16	15
28	16	45	16	41	16	36	16	32
29	17	03	16	58	16	54	16	50
30	17	20	17	15	17	11	17	07
31	17	38	17	32	17	28	17	24

A Table of the Sun's Declination.

Days of the Month.	November hath XXX Days.							
	Leap-year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declination		*Sun's Declination.*		*Sun's Declination.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*
1	17	52	17	48	17	44	17	40
2	18	08 South	18	04	18	00	17	56
3	18	24	18	50	18	16	18	12
4	18	40	18	35	18	32	18	28
5	18	55	18	51	18	47	18	43
6	19	09	19	05	19	02	18	58
7	19	24	19	20	19	16	19	13
8	19	38	19	34	19	30	19	27
9	19	51	19	48	19	44	19	41
10	20	04	20	01	19	58	19	54
11	20	17	20	14	20	11	20	08
12	20	30	20	27	20	24	20	20
13	20	42	20	39	20	36	20	13
14	20	54	20	51	20	48	20	45
15	21	05	21	02	20	59	20	57
16	21	16	21	13	21	11	21	08
17	21	27	21	24	21	21	21	19
18	21	37	21	34	21	32	21	29
19	21	47	21	44	21	42	21	39
20	21	56	11	53	21	51	21	49
21	22	05	22	03	22	00	21	58
22	22	13	22	11	22	09	22	07
23	22	21	22	19	22	17	22	15
24	22	29	22	27	22	25	22	23
25	22	36	22	34	22	33	22	31
26	22	43	22	41	22	40	22	38
27	22	49	22	48	22	46	22	45
28	22	55	22	54	22	52	22	51
29	23	00	22	59	22	58	22	56
30	23	05	23	04	23	03	23	02

Days of the Month.	December hath XXXI Days.							
	Leap-year.		*First after.*		*Second after.*		*Third after.*	
	Sun's Declination.		*Sun's Declin.*		*Sun's Declin.*		*Sun's Decli.*	
	D.	*M.*	*D.*	*M.*	*D.*	*M.*	*D.*	*M*
1	23	10	23	09	23	08	23	06
2	23	14 South	23	13	23	12	23	11
3	23	17	23	16	23	16	23	15
4	23	20	23	20	23	19	23	18
5	23	23	23	22	23	22	23	21
6	23	25	23	25	23	24	23	24
[illegible]	23	27	23	25	23	26	23	26
8	23	28	23	28	23	27	23	27
9	23	29	23	29	23	28	23	28
10	23	29	23	29	23	29	23	29
11	23	29	23	29	23	29	23	29
12	23	27	23	28	23	29	23	29
13	23	28	23	27	23	28	23	28
14	13	25	23	26	23	26	23	27
15	23	23	23	24	23	24	23	25
16	23	21	23	21	23	22	23	23
17	23	18	23	18	23	19	23	20
18	23	14	23	15	23	16	13	17
19	23	10	13	11	23	12	23	13
20	23	06	23	07	23	08	23	09
21	23	01	23	02	23	03	23	04
22	22	55	22	57	22	58	22	59
23	22	49	22	51	22	53	22	54
24	22	43	22	45	22	47	22	48
25	22	37	22	38	22	40	22	42
26	22	29	22	31	22	33	22	35
27	22	22	22	24	22	26	22	28
28	22	14	22	16	22	18	22	20
29	22	05	22	08	22	10	22	12
30	21	56	21	59	22	01	22	03
31	21	47	21	49	21	52	21	54

Theſe Tables of the Sun's Declination are ſo eaſy they need no Explanation ; only you muſt obſerve, they are made for the Meridian of *London* at Noon, and may ſerve without any Alteration at Noon, for Places near that Meridian ; but you may often have Occaſion for the Sun's Declination about the time of its Riſing and Setting, and often your Longitude is conſiderable from *London*, which brings us to the Conſideration of

PROBLEM II.

At any Time, at any Place, whoſe Longitude is known from London, *to find the Time of the Day or Night at* London.

Rule. If the Place is to the Eaſtward of *London*, the Longitude reduced into Time, muſt be taken from the Time where you are, the Remainder is the Time at *London*.

But if you are to the Weſtward of *London*, the Longitude reduced muſt be added to your Time, the Sum is the Hour at *London*.

Note, 15 Degrees of Longitude, is 1 Hour of Time ; but to ſave the Trouble of Reduction, you have in the following Table of *Natural Sines*, the Hours, Minutes and Seconds of Time, to almoſt every Minute of the Quadrant.

Example 1. At 6 in the Morning, at Fort St. *George* in *Eaſt India*, what is the Time at *London* ?

The Operation.

The Longitude of Fort St. *George* from *London* is 81 : 12 Eaſt, which reduced into Time is 5h. 24m. 48ſ. which taken from
6h. 00m. 00ſ.

leaves 0h. 35m. 12ſ. in the Morning at *London*.

Exam. 2. When it is Noon at Fort St. *George*, what Time is it at *London* ?

The Operation.

12h. 00m. 00ſ.
5h. 24m. 48ſ. ſubtract

Leaves 6h. 35m. 12ſ. in the Morning at *London*.

Example 3. When it is 7h. 10m. 22ſ. in the Evening, at Fort St. *George* what's the Time at *London* ? 5h. 24m. 48ſ. ſubtract

Leaves 1h. 45m. 34ſ. in the Afternoon at *London*.

Example 4. When it is 5h. 40m. 24ſ. in the Morning at *Barbadoes*, what is the Time at *London* ? 3h. 54m. 08ſ. being 58 : 32 Weſt Longitude, add

The Sum is 9h. 34m. 32ſ. in the Morning at *London*.

Example 5. At 12h. 00m. 00ſ. at *Barbadoes*, what's the Time at *London*.
Add 3h. 54m 08ſ. in the Afternoon at *London*.

Example 6. At 6h. 32m. 15ſ. at *Barbadoes*, what's the Time in *London*?
3h. 54m. 08ſ. add

10h. 26m. 23ſ. at Night in *London*.

This *Problem* being perfectly underſtood, there can be no extraordinary Difficulty in finding the Sun's Declination at any Hour at *London*, by the Daily Variation of the Declination, and conſequently the Sun's true Declination, at the very time you uſe the Sun; which brings us to

PROBLEM III.

To find the Latitude of the Place by an Obſervation of the Sun, See Page 81, 82. *Example* 1. *Auguſt* 1, 1729.

The Sun is by the Tables of Declination 14 : 59 on the N. ſide the Equin.
By Obſervation I am ———— 20 : 30 on the North ſide the Sun

Therefore, by Addition, I am 35 : 29 on the North ſide the Equinoctial; that is, I am in the Latit. of 35 : 29 North, by Obſervation.

Example 2. *June* 10, 1730.

The Sun is —— 23 : 29 on the N. ſide the Equinoctial by the Tables
By Obſervation I am 10 : 15 on the South ſide the Sun.

Therefore by Sub. I am 13 : 14 on the North ſide the Equinoctial, that is, in the Latitude of 13 : 14 North, by Obſervation.

Example 3. *Auguſt* 20, 1731.

The Sun is 8 : 48 on the N. ſide the Equinoctial by the Tables
By Obſervation I am 40 : 30 on the South ſide the Sun.

Therefore, by Sub. I am 31 : 42 on the South ſide the Equinoctial, that is, I am in the Latitude of 31 : 42 South, by Obſervation.

I could give you 3 more *Examples*, with the Sun being on the South ſide the Equinoctial, and my being to the Northward or Southward of the Sun, which *Examples* will be ſo like theſe, that he who knows the one, muſt be able to perform the other; and therefore I think theſe *Examples* ſufficient.

Theſe are the General Caſes that happen at Sea, in ſailing to the Southward, but in ſome Northern Voyages, as to *Greenland* and the *Whale Fiſhery*, you may have the Sun above the Horizon for ſeveral Days, then every 12 Hours you have an Opportunity of finding the Latitude, *viz*. when the

Sun is on the South Part of your Meridian, it is done as we have already explain'd; but when the Sun is on the North Part of it, the Latitude is thus found,

Rule. From the Sun's Declination, take the Sun's Altitude, the Remainder is the Complement of the Latitude.

Example.

Suppoſe the Sun's Declination was 22 : 10 North.
the Sun's Altitude 5 : 50 N. by the Quadrant or Foreſtaff.

The Complement of the Latitude is 16 : 20

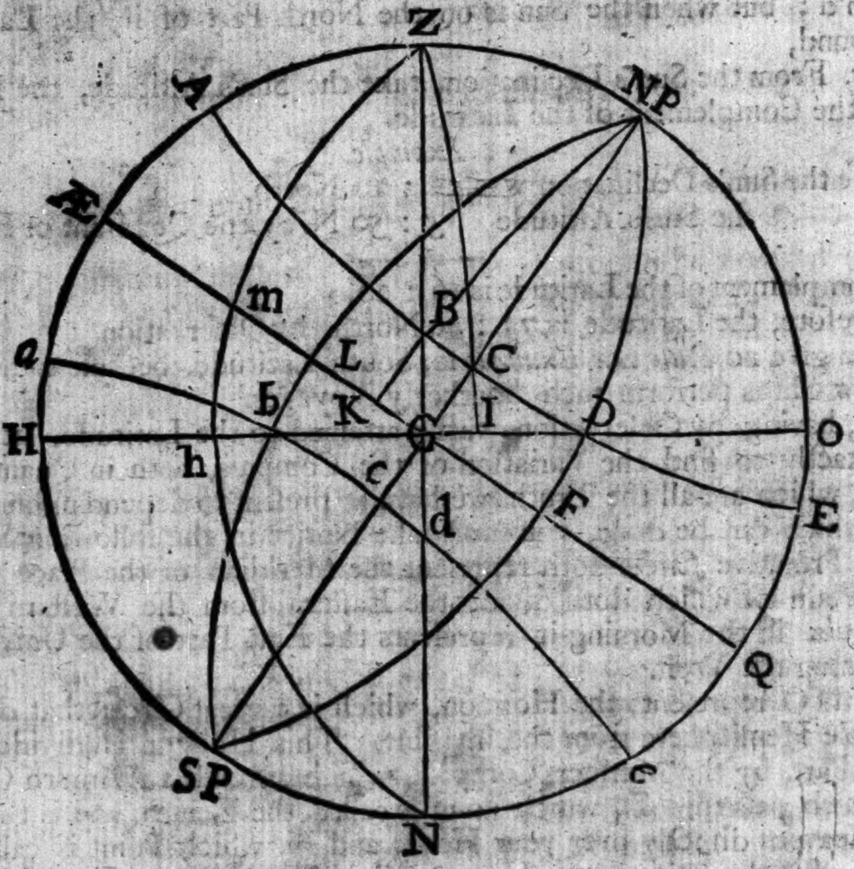
Therefore, the Latitude is 73 : 40 North, by Obſervation.

I need give no *Rule* nor *Example* for South Latitude, becauſe none of our *European* Ships perform ſuch Southerly Voyages.

Now, having by Obſervation exactly attained to the Latitude, let us proceed exactly to find the Variation of the Compaſs, both in Quantity and Quality, which are all the Truths we have at preſent to depend upon at Sea; before which can be done, you muſt take Notice in the following Scheme, that the Primitive Circle doth repreſent the Meridian of the Place you are in, the Plain of which doth divide the Eaſtern from the Weſtern Hemiſphere, *viz.* in the Morning it repreſents the Eaſt Part of the Univerſe, in the Evening the Weſt.

That H O repreſents the Horizon, which is a great Circle that divideth the viſible Hemiſphere from the inviſible. This Horizon is divided into 32 equal Parts by the Mariners Compaſs, which are called Azimuth Circles; all of which paſs thro' Z, which Point is called the Zenith, and is the Point in the Heavens directly over your Head, and N. which Point is called the Nadir, and is the Point in the Heavens directly under your Feet. Now the Points Z and N are alſo called the Poles of the Horizon; for the Poles of any great Circle are two Points, each 90 Degrees diſtant from every Part of that Circle; and laſtly theſe Azimuth Circles croſs the Horizon at Right-Angles, and O we will ſuppoſe to be the North Point of it, therefore H which is its oppoſite, muſt be the South; that G, which is midway between them, muſt repreſent the Eaſt point in the Morning, but the Weſt in the Evening; and therefore Z O N is the North Part of the Meridian, and Z H N is the South Part of it; that Z G N is the Eaſt Azimuth in the Morning, but Weſt in the Evening.

Now, let the Point NP repreſent the North Pole of the World, and SP the South, therefore ÆGQ muſt be the Equinoctial, *viz.* a great Circle 90 Degrees equi-diſtant from the Poles of the World; now, while you are in North Latitude, the North Pole is above the Horizon, and on the North ſide the Meridian; when you are in South Latitude, the South Pole is above the Horizon, and on the South ſide the Meridian; when you are on the Equinoctial, both Poles are in the Horizon, the North Pole in the North Point of it, and the South Pole in the South; and then as you ſail either Northerly or Southerly, you elevate the one Pole and depreſs the



the other, for the one is always as much below the Horizon as the other is above it; and therefore the Latitude of the Place, is the Heighth of the Pole above the Horizon, which is alſo the Diſtance of the Zenith from the Equinoctial.

Now, the Sun either moveth in the Equinoctial, or nearly parallel to it, becauſe the diurnal Difference of the Sun's Declination is but little in 24 Hours. ABCDE is a Parallel of the Sun's North Declination, abcde is a Parallel of the Sun's South Declination. Now, if the Sun moveth in the Equinoctial, it is plain the Sun will be at Q, on the North Part of the Meridian at Midnight, which is her greateſt Depreſſion; that at Noon the Sun will be at Æ, *viz.* upon the South Part of the Meridian, and HÆ is the greateſt or Meridian Altitude of the Sun that Day, at ſix in the Morning the Sun will be at G, *viz.* half way between ÆQ; now G is both in the Horizon and in the Equinoctial, and it is the Eaſt Point in the Morning and Weſt in the Afternoon; and therefore when the Sun is in the Equinoctial, it riſes exactly on the Eaſt point of the Compaſs, and at ſix in the Morning, and doth ſet on the Weſt Point, exactly at ſix in the Evening.

Again, ſuppoſe the Sun was to move on the North Parallel of Declination EDCBA, it is clear, at Midnight it will be at E, at Noon at the Point A, at ſix in the Morning, and Evening at the Point C, *viz.* midway between E and A; but as the Sun moves from E towards A, it is plain, when it comes to D it is in the Horizon, and in the Morning ariſing, from thence it muſt move to C, where it will be at ſix in the Morning; from C it muſt move to B, where it will be on the Eaſt point of the Compaſs, from thence to A, where it will be at Noon: Then we muſt in the Afternoon ſuppoſe the Sun to come down on the back part of the Scheme, where it will be at B upon the Weſt point of the Compaſs, at C the Sun will be at ſix in the Evening, and that the Sun muſt move from C to D before it doth ſet; and here is one thing more you muſt obſerve, while the Sun is at D, that GD is the Amplitude of the Sun, which is the Part of the Horizon intercepted between the Eaſt or Weſt Points thereof and the Center of the Sun; that GF which is equal to CD, is the Sun's Difference of Aſcenſion, or how much in this Caſe the Sun riſeth before and ſetteth after ſix. That CI is the Sun's Altitude, and GI is the Sun's Azimuth at ſix in the Morning and Evening. That BG is the Sun's Altitude at Eaſt and Weſt, and KG equal to CB is the time after ſix, that the Sun is on the Eaſt point of the Compaſs, and the time before ſix, that it is on the Weſt.

Again, ſuppoſe the Sun was to move on the Parallel of Declination edc ba, at Midnight it will be at e, at Eaſt at d, at ſix in the Morning at c, and will not riſe till it doth come into the Horizon at b, where Gb is the Sun's Amplitude from the Eaſt towards the South in the Morning, and it is Weſt Southerly at ſetting; GL equal to cb is the Difference of Aſcenſion, or the time after ſix that the Sun doth riſe, and the time before ſix it doth ſet.

Theſe Things thoroughly underſtood, there can be no Difficulty in the Solution of the following *Problems* of *Aſtronomy*, by the foregoing *Traverſe Table*, aud this following Table of *Natural Sines*; with an annext Table of *Natural Tangents* to every Minute of the Sun's Declination.

Min.

Min	Deg 0	Deg 1	Deg 2	Deg 3	Deg 4	Deg 5	Deg 6	Deg 7	Deg 8	Deg 9	Min. Sec.
0	00.0	17.5	34.9	52.3	69.8	87.2	104.5	121.9	139.2	156.4	0 . 00
1	00.3	17.7	35.2	52.6	70.0	87.4	104.8	122.2	139.5	156.7	0 . 04
2	00.6	18.0	35.5	52.9	70.3	87.7	105.1	122.4	139.7	157.0	0 . 08
3	00.9	18.3	35.8	53.2	70.5	88.0	105.4	122.7	140.0	157.3	0 . 12
4	01.2	18.6	36.1	53.5	70.9	88.3	105.7	123.0	140.3	157.6	0 . 16
5	01.5	18.9	36.4	53.8	71.2	88.6	106.0	123.3	140.6	157.9	0 . 20
6	01.7	19.2	35.6	54.1	71.5	88.9	106.3	123.6	140.9	158.2	0 . 24
7	02.0	19.5	36.9	54.4	71.8	89.2	106.6	123.9	141.2	158.4	0 . 28
8	02.3	19.8	37.2	54.7	72.1	89.5	106.8	124.2	141.5	158.7	0 . 32
9	02.6	20.1	37.5	55.0	72.1	89.8	107.1	124.5	141.8	159.0	0 . 36
10	02.9	20.4	37.8	55.2	72.7	90.1	107.4	124.8	142.1	159.3	0 . 40
11	03.2	20.7	38.1	55.5	72.9	90.3	107.7	125.0	142.3	159.6	0 . 44
12	03.5	20.9	38.4	55.8	73.2	90.6	108.0	125.3	142.6	159.9	0 . 48
13	03.8	21.2	38.7	56.1	73.5	90.9	103.3	125.6	142.9	160.2	0 . 52
14	04.1	21.5	39.0	56.4	73.8	91.2	108.6	125.9	143.2	160.4	0 . 56
15	04.4	21.8	39.3	56.7	74.1	91.5	108.9	126.2	143.5	160.7	1 . 00
16	04.7	22.1	39.6	57.0	74.4	91.8	109.2	126.5	143.8	161.0	1 . 04
17	04.9	22.4	39.8	57.3	74.7	92.1	109.4	126.8	144.1	161.3	1 . 08
18	05.2	22.7	40.1	57.6	75.0	92.4	109.7	127.1	144.4	161.6	1 . 12
19	05.5	23.0	40.4	57.9	75.3	92.7	110.0	127.4	144.6	161.9	1 . 16
20	05.8	23.3	40.7	58.1	75.6	92.9	110.3	127.6	144.9	162.2	1 . 20
21	06.1	23.6	41.0	58.4	75.8	93.2	110.6	127.9	145.2	162.5	1 . 21
22	06.4	23.9	41.3	58.7	76.1	93.5	110.9	128.2	145.5	162.8	1 . 28
23	06.7	24.1	41.6	59.0	76.4	93.8	111.2	128.5	145.8	163.0	1 . 32
24	07.0	24.4	41.9	59.3	76.7	94.1	111.5	128.8	146.1	163.3	1 . 36
25	07.3	24.7	42.2	59.6	77.0	94.4	111.8	129.1	146.4	163.6	1 . 40
26	07.6	25.0	42.5	59.9	77.3	94.7	112.0	129.4	146.7	163.9	1 . 44
27	07.9	25.3	42.7	60.2	77.6	95.0	112.3	129.7	146.9	164.2	1 . 48
28	08.1	25.6	43.0	60.5	77.9	95.3	112.6	129.9	147.2	164.5	1 . 52
29	08.4	25.9	43.3	60.8	78.2	95.6	112.9	130.2	147.5	164.8	1 . 56
30	08.7	26.2	43.6	61.0	78.5	95.8	113.2	130.5	147.8	165.0	2 . 00
31	09.0	26.5	43.9	61.3	78.7	96.1	113.5	130.8	148.1	165.3	2 . 04
32	09.3	26.8	44.2	61.6	79.0	96.4	113.8	131.1	148.4	165.6	2 . 08
33	09.6	27.0	44.5	61.9	79.3	96.7	114.1	131.4	148.7	169.9	2 . 12
34	09.9	27.3	44.8	62.2	79.6	97.0	114.4	131.7	149.0	166.2	2 . 16
35	10.2	27.6	45.1	62.5	79.9	97.3	114.6	132.0	149.2	166.5	2 . 20
36	10.5	27.9	45.4	62.8	80.2	97.6	114.9	132.3	149.5	166.8	2 . 24
37	10.8	28.2	45.7	63.1	80.5	97.9	115.2	132.5	149.8	167.1	2 . 28
38	11.1	28.5	45.9	63.4	80.8	98.2	115.5	132.8	150.1	167.3	2 . 32
39	11.3	28.8	46.2	63.7	81.1	98.5	115.8	133.1	150.4	167.6	2 . 36
40	11.6	29.1	46.5	64.0	81.4	98.7	116.1	133.4	150.7	167.9	2 . 40
41	11.9	29.4	46.8	64.2	81.6	99.0	116.4	133.7	151.0	168.2	2 . 44
42	12.2	29.7	47.1	64.5	81.9	99.3	116.7	134.0	151.3	168.5	2 . 48
43	12.5	30.0	47.4	64.8	82.2	99.6	117.0	134.3	151.5	168.8	2 . 52
44	12.8	30.2	47.7	65.1	82.5	99.9	117.2	134.6	151.8	169.1	2 . 56
45	13.1	30.5	48.0	65.4	82.8	100.2	117.5	134.9	152.1	169.3	3 . 00
46	13.4	30.8	48.3	65.7	83.1	100.5	117.8	135.1	152.4	169.6	3 . 04
47	13.7	31.1	48.6	66.0	83.4	100.8	118.1	135.4	152.7	169.9	3 . 08
48	14.0	31.4	48.8	66.3	83.7	101.0	118.4	135.7	153.0	170.2	3 . 12
49	14.3	31.7	49.1	66.6	84.0	101.3	118.7	136.0	153.3	170.5	3 . 16
50	14.5	32.0	49.4	66.9	84.2	101.6	119.0	136.3	153.6	170.8	3 . 20
51	14.8	32.3	49.7	67.1	84.5	101.9	119.3	136.6	153.8	171.1	3 . 24
52	15.1	32.6	50.0	67.4	84.8	102.2	119.6	136.9	154.1	171.4	3 . 28
53	15.4	32.9	50.3	67.7	85.1	102.5	119.8	137.2	154.4	171.6	3 . 32
54	15.7	33.2	50.6	68.0	85.4	102.8	120.1	137.4	154.7	171.9	3 . 36
55	16.0	33.4	50.9	68.3	85.7	103.1	120.4	137.7	155.0	172.2	3 . 40
56	16.3	33.7	51.2	68.6	86.0	103.4	120.7	138.0	155.3	172.5	3 . 44
57	16.6	34.0	51.5	68.9	86.3	103.7	121.0	138.3	155.6	172.8	3 . 48
58	16.9	34.3	51.8	69.2	86.6	103.9	121.3	138.6	155.9	173.1	3 . 52
59	17.2	34.6	52.0	69.5	86.9	104.2	121.6	138.9	156.1	173.4	3 . 56
	0.00 H.M	0.04 HM	0.08 HM	0.12 HM	0.16 H.M	0.20 HM	0.24 H.M	0.28 HM.	0.32 HM	0. 6 H.M	

Min.	Deg. 10	Deg. 11	Deg 12	Deg. 13	Deg 14	Deg. 15	Deg. 16	Deg. 17	Deg. 18	Deg. 19	Min	Sec.
0	173.6	190.8	207.9	225.0	241.9	258.8	275.6	292.4	309.0	325.6	0	00
1	173.9	191.1	208.2	225.2	242.2	259.1	275.9	292.6	309.3	325.8	0	07
2	174.2	191.4	208.5	225.5	242.5	259.4	276.2	292.9	309.6	326.1	0	08
3	174.5	191.7	208.8	225.8	242.8	259.7	276.5	293.2	309.8	326.4	0	12
4	174.8	192.0	209.0	226.1	243.1	259.9	276.8	293.5	310.1	326.7	0	16
5	175.1	192.2	209.3	226.4	243.3	260.2	277.0	293.8	310.4	326.9	0	20
6	175.4	192.5	209.6	226.7	243.6	260.5	277.3	294.0	310.7	327.2	0	24
7	175.7	192.8	209.9	226.9	243.9	260.8	277.6	294.3	311.0	327.5	0	28
8	175.9	193.1	210.2	227.2	244.2	261.1	277.9	294.6	311.2	327.8	0	32
9	176.2	193.4	210.5	227.5	244.5	261.3	278.2	294.9	311.5	328.0	0	36
10	176.5	193.7	210.8	227.8	244.7	261.6	278.4	295.2	311.8	328.3	0	40
11	176.8	193.9	211.0	228.1	245.0	261.9	278.7	295.4	312.1	328.6	0	44
12	177.1	194.2	211.3	228.4	245.3	262.2	279.0	295.7	312.3	328.9	0	48
13	177.4	194.5	211.6	228.6	245.6	262.5	279.3	296.0	312.6	329.1	0	52
14	177.7	194.8	211.9	228.9	246.9	262.8	279.5	296.3	312.9	329.4	0	56
15	177.9	195.1	212.2	229.2	246.2	263.0	279.8	296.5	313.2	329.7	1	00
16	178.2	195.4	212.5	229.5	246.4	263.3	280.1	296.8	313.4	330.0	1	04
17	178.5	195.7	212.7	229.8	246.7	263.6	280.4	297.1	313.7	330.2	1	08
18	178.8	195.9	213.0	230.0	247.0	264.9	280.7	297.4	314.0	330.5	1	12
19	179.1	196.2	213.3	230.3	247.3	264.2	280.9	297.7	314.3	330.8	1	16
20	179.4	196.5	213.6	230.6	247.6	264.4	281.2	297.9	314.5	331.1	1	20
21	179.7	196.8	213.9	230.9	247.8	264.7	281.5	298.2	314.8	331.3	1	24
22	179.9	197.1	214.2	231.2	248.1	265.0	281.8	298.5	315.1	331.6	1	28
23	180.2	197.4	214.5	231.5	248.4	265.3	282.1	298.8	315.4	331.9	1	32
24	180.5	197.7	214.7	231.7	248.8	265.6	282.3	299.0	315.6	332.2	1	36
25	180.8	197.9	215.0	232.0	249.0	265.8	282.6	299.3	315.9	332.4	1	40
26	181.1	198.2	215.3	232.3	249.3	266.1	282.9	299.6	316.2	332.7	1	44
27	181.4	198.5	215.6	232.6	249.5	266.4	283.2	299.9	316.5	333.0	1	48
28	181.7	198.8	215.9	232.9	249.8	266.7	283.5	300.2	316.8	333.3	1	52
29	181.9	199.1	216.2	233.2	250.1	267.0	283.7	300.4	317.1	333.5	1	56
30	182.2	199.4	216.4	233.4	250.4	267.2	284.0	300.7	317.3	333.8	2	00
31	182.5	199.7	216.7	233.7	250.7	267.5	284.3	301.0	317.6	334.1	2	04
32	182.8	199.9	217.0	234.0	250.9	267.8	284.6	301.3	317.9	334.4	2	08
33	183.1	200.2	217.3	234.3	251.2	268.1	284.9	301.5	318.1	334.6	2	12
34	183.4	200.5	217.6	234.6	251.5	268.4	285.1	301.8	318.4	334.9	2	16
35	183.7	200.8	217.9	234.9	251.8	268.6	285.4	302.1	318.7	335.2	2	20
36	184.0	201.1	218.1	235.1	252.1	268.9	285.7	302.4	319.0	335.5	2	24
37	184.2	201.4	218.4	235.4	252.4	269.2	286.0	302.6	319.2	335.7	2	28
38	184.5	201.6	218.7	235.7	252.6	269.5	286.2	302.9	319.5	336.0	2	32
39	184.8	201.9	219.0	236.0	252.9	269.8	286.5	303.2	319.8	336.3	2	36
40	185.1	202.2	219.3	236.3	253.2	270.0	286.8	303.5	320.1	336.5	2	40
41	185.4	202.5	219.6	236.6	253.5	270.3	287.1	303.8	320.3	336.8	2	44
42	185.7	202.8	219.8	236.8	253.8	270.6	287.4	304.0	320.6	337.1	2	48
43	186.0	203.1	220.1	237.1	254.0	270.9	287.6	304.3	320.9	337.4	2	52
44	186.2	203.4	220.4	237.4	254.3	271.2	287.9	304.6	321.2	337.6	2	56
45	186.5	203.6	220.7	237.8	254.6	271.4	288.2	304.9	321.4	337.9	3	00
46	186.8	203.9	221.0	238.0	254.9	271.7	288.5	305.1	321.7	338.2	3	04
47	187.1	204.2	221.3	238.3	255.2	272.0	288.8	305.4	322.0	338.5	3	08
48	187.4	204.5	221.5	238.5	255.4	272.3	289.0	305.7	322.3	338.7	3	12
49	187.7	204.8	221.8	238.8	255.7	272.6	289.3	306.0	322.5	339.0	3	16
50	188.0	205.1	222.1	239.1	256.0	272.8	289.6	306.2	322.8	339.3	3	20
51	188.2	205.4	222.4	239.4	256.3	273.1	289.9	306.5	323.1	339.6	3	24
52	188.5	205.6	222.7	239.7	256.6	273.4	290.1	306.8	323.4	339.8	3	28
53	188.8	205.9	223.0	239.9	256.9	273.7	290.4	307.1	323.6	340.1	3	32
54	189.1	206.2	223.3	240.2	257.1	274.0	290.7	307.4	323.9	340.4	3	36
55	189.4	206.5	223.5	240.5	257.4	274.3	290.0	307.6	324.2	340.7	3	40
56	189.7	206.8	223.8	240.8	257.7	274.5	291.3	307.9	324.5	340.9	3	44
57	189.0	207.1	224.1	241.1	258.0	274.8	291.5	308.2	324.7	341.2	3	48
58	190.2	207.3	224.4	241.4	258.3	275.1	291.8	308.5	325.0	341.5	3	52
59	190.5	270.6	224.7	241.6	258.5	275.4	292.1	308.7	325.3	341.7	3	56
	0:40	0:44	0:48	0.52	0.56	1:00	1:04	1:08	1:12	1:16		
	H M	H M	H·M	HM	HM	HM	HM	HM	HM	HM		

Min.	Deg 20	Deg 21	Deg 22	Deg 23	Deg 24	Deg 25	Deg 26	Deg 27	Deg 28	Deg 29	Min.	Sec.
0	342.0	358.4	374.6	390.7	406.7	422.6	438.4	454.0	469.5	484.8	0	00
1	342.3	358.6	374.9	391.0	407.0	422.9	438.6	454.2	469.7	485.1	0	04
2	342.6	358.9	375.1	391.3	407.3	423.1	438.9	454.5	470.0	485.3	0	08
3	342.8	359.2	375.4	391.5	407.5	423.4	439.2	454.8	470.2	485.6	0	12
4	343.1	359.5	375.7	391.8	407.8	423.7	439.4	455.0	470.5	485.8	0	16
5	343.4	359.7	376.0	392.1	408.1	423.9	439.7	455.3	470.8	486.1	0	20
6	343.7	360.0	376.2	392.3	408.3	424.2	440.0	455.5	471.0	486.3	0	24
7	343.9	360.3	376.5	392.6	408.6	424.5	440.2	455.8	471.3	486.6	0	28
8	344.2	360.5	376.8	392.9	408.9	424.7	440.5	456.1	471.5	486.8	0	32
9	344.5	360.8	377.0	393.1	409.1	425.0	440.7	456.3	471.8	487.1	0	36
10	344.8	361.1	377.3	393.4	409.4	425.3	441.0	456.6	472.0	487.4	0	40
11	345.0	361.4	377.6	393.7	409.7	425.5	441.2	456.8	472.3	487.6	0	44
12	345.3	361.6	377.8	393.9	409.9	425.8	441.5	457.1	472.6	487.9	0	48
13	345.6	361.9	378.1	394.2	410.2	426.0	441.8	457.4	472.8	488.1	0	52
14	345.8	362.1	378.4	394.5	410.5	426.3	442.0	457.6	473.1	488.4	0	56
15	346.1	362.4	378.6	394.7	410.7	426.6	442.3	457.9	473.3	488.6	1	00
16	346.4	362.7	378.9	395.0	411.0	426.8	442.5	458.1	473.6	488.9	1	04
17	346.7	363.0	379.2	395.3	411.2	427.1	442.8	458.4	473.8	489.1	1	08
18	346.9	363.3	379.5	395.5	411.5	427.4	443.1	458.6	474.1	489.4	1	12
19	347.2	363.5	379.7	395.8	411.8	427.6	443.3	458.9	474.3	489.6	1	16
20	347.5	363.8	380.0	396.1	412.0	427.9	443.6	459.2	474.6	489.9	1	20
21	347.8	364.1	380.3	396.3	412.3	428.1	443.9	459.4	474.9	490.1	1	24
22	348.0	364.3	380.5	396.6	412.6	428.4	444.1	459.7	475.1	490.4	1	28
23	348.3	364.6	380.8	396.9	412.8	428.7	444.4	459.9	475.4	490.7	1	32
24	348.6	364.9	381.1	397.1	413.1	428.9	444.6	460.2	475.6	490.9	1	36
25	348.8	365.1	381.3	397.4	413.4	429.2	444.9	460.5	475.9	491.2	1	40
26	349.1	365.4	381.6	397.7	413.6	429.5	445.2	460.7	476.1	491.4	1	44
27	349.4	365.7	381.9	397.9	413.9	429.7	445.4	461.0	476.4	491.7	1	48
28	349.7	366.0	382.1	398.2	414.2	430.0	445.7	461.2	476.6	491.9	1	52
29	349.9	366.2	382.4	398.5	414.4	430.2	445.9	461.5	476.9	492.2	1	56
30	350.2	266.5	382.7	398.7	414.7	430.5	446.2	461.7	477.2	492.4	2	00
31	350.5	366.8	383.0	399.0	415.0	430.8	446.5	462.0	477.4	492.7	2	04
32	350.8	357.0	383.2	399.3	415.2	431.0	446.7	462.3	477.7	492.9	2	08
33	351.0	367.3	383.5	399.5	415.5	431.3	447.0	462.5	477.9	493.2	2	12
34	351.3	367.6	383.8	399.8	415.8	431.6	447.2	462.8	478.2	493.4	2	16
35	351.6	367.9	334.0	400.1	416.0	431.8	447.5	463.0	478.4	493.7	2	20
36	351.8	368.1	384.3	400.4	416.3	432.1	447.8	463.3	478.7	493.9	2	24
37	352.1	368.4	384.6	400.6	416.5	432.3	448.0	463.6	478.9	494.2	2	28
38	332.4	368.7	384.8	400.9	416.8	432.6	448.3	463.8	479.2	494.4	2	32
39	352.7	368.9	385.1	401.1	417.1	432.9	448.5	464.1	479.5	494.7	2	36
40	352.9	369.2	385.4	401.4	417.3	433.1	448.8	464.3	479.7	495.0	2	40
41	353.2	369.5	385.6	401.7	417.6	433.4	449.1	464.6	480.0	495.2	2	44
42	353.5	369.7	385.9	401.9	417.9	433.7	449.3	464.8	480.2	495.5	2	48
43	353.7	370.0	386.2	402.2	418.1	433.9	449.6	465.1	480.5	495.7	2	52
44	354.0	370.3	386.4	402.5	418.4	434.2	449.8	465.4	480.7	496.0	2	56
45	354.3	370.6	386.7	402.7	418.7	434.4	450.1	465.6	481.0	496.2	3	00
46	354.6	370.8	387.0	403.0	418.9	434.7	450.4	465.9	481.2	496.5	3	04
47	354.8	371.1	387.2	403.3	419.2	435.0	450.6	466.1	481.5	496.7	3	08
48	355.1	371.4	387.5	403.5	419.5	435.2	450.9	466.4	481.8	497.0	3	12
49	355.4	371.6	387.8	403.8	419.7	435.5	451.1	466.6	482.0	497.2	3	16
50	355.7	371.9	388.1	404.1	420.0	435.8	451.4	466.9	482.3	497.5	3	20
51	355.9	372.2	388.3	404.3	420.2	436.0	451.7	467.2	482.5	497.7	3	24
52	356.2	372.4	388.6	404.6	420.5	436.3	451.9	467.4	482.8	498.0	3	28
53	356.5	372.7	388.9	404.9	420.8	436.5	452.2	467.7	483.0	498.2	3	32
54	356.7	373.0	389.1	405.1	421.0	436.8	452.4	467.9	483.3	498.5	3	36
55	357.0	373.3	389.4	405.4	421.3	437.1	452.7	468.2	483.5	498.7	3	40
56	357.3	373.5	389.7	405.7	421.6	437.3	453.0	468.4	483.8	499.0	3	44
57	357.6	373.8	389.9	405.9	421.8	437.6	453.2	468.7	484.3	499.2	3	48
58	357.8	374.1	390.2	400.2	422.1	437.8	453.5	469.0	484.0	499.5	3	52
59	358.1	374.3	390.5	406.5	422.4	438.1	453.7	469.2	484.6	499.7	3	56
	1.20 H.M.	1.24 HM	1.28 HM	1.32 HM	1.36 H.M	1.40 H.M.	1.44 H.M	1.48 HM	1.52 HM	1.56 H.M		

Min	Deg. 30	Deg. 31	Deg. 32	Deg. 33	Deg. 34	Deg. 35	Deg. 36	Deg. 37	Deg. 38	Deg. 39	Min.	Sec.
0	500.0	515.0	529.9	544.6	559.2	573.6	587.8	601.8	615.7	629.3	0	00
1	500.3	515.3	530.2	544.9	559.4	573.8	588.0	602.0	615.9	629.5	0	04
2	500.5	515.5	530.4	545.1	559.7	574.1	588.3	602.3	616.1	629.8	0	08
3	500.8	515.8	530.7	545.4	560.0	574.3	588.5	602.5	616.3	630.0	0	12
4	501.0	516.0	530.9	545.6	560.2	574.5	588.7	602.7	616.6	630.2	0	16
5	501.3	516.3	531.2	545.9	560.4	574.8	589.0	603.0	616.8	630.5	0	20
6	501.5	516.5	531.4	546.1	560.6	575.0	589.2	603.2	617.0	630.7	0	24
7	501.8	516.8	531.6	546.3	560.9	575.2	589.4	603.4	617.3	630.9	0	28
8	502.0	517.0	531.9	546.6	561.1	575.5	589.7	603.7	617.5	631.1	0	32
9	502.3	517.3	532.1	546.8	561.4	575.7	589.9	603.9	617.7	631.4	0	36
10	502.5	517.5	532.4	547.1	561.6	576.0	590.1	604.1	618.0	631.6	0	40
11	502.8	517.8	532.6	547.3	561.8	576.2	590.4	604.4	618.2	631.8	0	44
12	503.0	518.0	532.9	547.6	562.1	576.4	590.6	604.6	618.4	632.0	0	48
13	503.3	518.3	533.1	547.8	562.3	576.7	590.8	604.8	618.6	632.3	0	52
14	503.5	518.5	533.4	548.0	562.6	576.9	591.1	605.1	618.9	632.5	0	56
15	503.8	518.8	533.6	548.3	562.8	577.1	591.3	605.3	619.1	632.7	1	00
16	504.0	519.0	533.9	548.5	563.0	577.4	591.5	605.5	619.3	632.9	1	04
17	504.3	519.3	534.1	548.8	563.3	577.6	591.8	605.8	619.6	633.2	1	08
18	504.5	519.5	534.4	549.0	563.5	577.9	592.0	606.0	619.8	633.4	1	12
19	504.8	519.8	534.6	549.3	563.8	578.1	592.2	606.2	620.0	633.6	1	16
20	505.0	520.0	534.8	549.5	564.0	578.3	592.5	606.5	620.2	633.8	1	20
21	505.3	520.3	535.1	549.8	564.2	578.6	592.7	606.7	620.5	634.1	1	24
22	505.5	520.5	535.3	550.0	564.5	578.8	593.0	606.9	620.7	634.3	1	28
23	505.8	520.8	535.6	550.2	564.7	579.0	593.2	607.1	620.9	634.5	1	32
24	506.0	521.0	535.8	550.5	565.0	579.3	593.4	607.4	621.1	634.7	1	36
25	506.3	521.3	536.1	550.7	565.2	579.5	593.7	607.6	621.4	635.0	1	40
26	506.5	521.5	536.3	551.0	565.4	579.8	593.9	607.8	621.6	635.2	1	44
27	506.8	521.8	536.6	551.2	565.7	580.0	594.1	608.1	621.8	635.4	1	48
28	507.0	522.0	536.8	551.5	565.9	580.2	594.4	608.3	622.1	635.6	1	52
29	507.3	522.3	537.1	551.7	566.2	580.5	594.6	608.5	622.3	635.9	1	56
30	507.5	522.5	537.3	551.9	556.4	580.7	594.8	608.8	622.5	636.1	2	00
31	507.8	522.7	537.5	552.2	566.6	580.9	595.1	609.0	622.7	636.3	2	04
32	508.0	523.0	537.8	552.4	566.9	581.2	595.3	609.2	623.0	636.5	2	08
33	508.3	523.2	538.0	552.7	567.1	581.4	595.5	609.5	623.2	636.8	2	12
34	508.5	523.5	538.3	552.9	567.4	581.6	595.8	609.7	623.4	637.0	2	16
35	508.8	523.7	538.5	553.1	567.6	581.9	596.0	609.9	623.7	637.2	2	20
36	509.0	524.0	538.8	553.4	567.8	582.1	596.2	610.1	623.9	637.4	2	24
37	509.3	524.2	539.0	553.6	568.1	582.4	596.5	610.4	624.1	637.6	2	28
38	509.5	524.5	539.3	553.9	568.3	582.6	596.7	610.6	624.3	637.9	2	32
39	509.8	524.7	539.5	554.1	568.6	582.8	596.9	610.8	624.6	638.1	2	36
40	510.0	525.0	539.8	554.4	568.8	583.1	597.2	611.1	624.8	638.3	2	40
41	510.3	525.2	540.0	554.6	569.0	583.3	597.4	611.3	625.0	638.5	2	44
42	510.5	525.5	540.2	554.8	569.3	583.5	597.6	611.5	625.2	638.8	2	48
43	510.8	525.7	540.5	555.1	569.5	583.8	597.9	611.8	625.5	639.0	2	52
44	511.0	526.0	540.7	555.3	569.8	584.0	598.1	612.0	625.7	639.2	2	56
45	511.3	526.2	541.0	555.6	570.0	584.2	598.3	612.2	625.9	639.4	3	00
46	511.5	526.5	541.2	555.8	570.2	584.5	598.6	612.4	626.2	639.7	3	04
47	511.8	526.7	541.5	556.1	570.5	584.7	598.8	612.7	626.4	639.9	3	08
48	512.0	527.0	541.7	556.3	570.7	585.0	599.0	612.9	626.6	640.1	3	12
49	512.3	527.2	542.0	556.5	571.0	585.2	599.3	613.1	626.8	640.3	3	16
50	512.5	527.5	542.2	556.8	571.2	585.4	599.5	613.4	627.1	640.6	3	20
51	512.8	527.7	542.4	557.0	571.4	585.7	599.7	613.6	627.3	640.8	3	24
52	513.0	527.9	542.7	557.3	571.7	585.9	600.0	613.8	627.5	641.0	3	28
53	513.3	528.2	542.9	557.5	571.9	586.1	600.2	614.1	627.7	641.2	3	32
54	513.5	528.4	543.2	557.7	572.1	586.4	600.4	614.3	628.0	641.4	3	26
55	513.8	528.7	543.4	558.0	572.4	586.6	600.7	614.5	628.2	641.7	3	40
56	514.0	528.9	543.7	558.2	572.6	586.8	600.9	614.7	628.4	641.9	3	44
57	514.3	529.2	543.9	558.5	572.9	587.1	601.1	615.0	628.6	642.1	3	48
58	514.5	529.4	544.2	558.7	573.1	587.3	601.4	615.2	628.9	642.3	3	52
59	514.8	529.7	544.4	559.0	573.3	587.5	601.6	615.4	629.1	642.6	3	56
	2:00 HM	2:04 HM	2:08 HM	2:12 HM	2:16 HM	2:20 HM	2:24 HM	2:28 HM	2:32 HM	2:36 HM		

Min	Deg 40	Deg 41	Deg 42	Deg 43	Deg 44	Deg 45	Deg 46	Deg 47	Deg 48	Deg 49	Min.	Sec.
0	642.8	656.1	669.1	682.0	694.7	707.1	719.3	731.4	743.1	754.7	0	00
1	643.0	656.3	669.3	682.2	694.9	707.3	719.5	731.6	743.3	754.9	0	04
2	643.2	656.5	669.6	682.4	695.1	707.5	719.7	731.8	743.5	755.1	0	08
3	643.5	656.7	669.8	682.6	695.3	707.7	719.9	731.9	743.7	755.3	0	12
4	643.7	656.9	670.0	682.8	695.5	707.9	720.1	732.1	743.9	755.5	0	16
5	643.9	657.2	670.2	683.1	695.7	708.1	720.3	732.3	744.1	755.7	0	20
6	644.1	657.4	670.4	683.3	695.9	708.3	720.6	732.5	744.3	755.9	0	24
7	644.3	657.6	670.6	683.5	696.1	708.5	720.8	732.7	744.5	756.0	0	28
8	644.6	657.8	670.9	683.7	696.3	708.8	721.0	732.9	744.7	756.2	0	32
9	644.8	658.0	671.1	683.9	696.5	709.0	721.2	733.1	744.9	756.4	0	36
10	645.0	658.3	671.3	684.1	696.7	709.2	721.4	733.3	745.1	756.6	0	40
11	645.2	658.5	671.5	684.3	697.0	709.4	721.6	733.5	745.3	756.8	0	44
12	645.5	658.7	671.7	684.5	697.2	709.6	721.8	733.7	745.5	757.0	0	48
13	645.7	658.9	671.9	684.8	697.4	709.8	721.0	733.9	745.7	757.2	0	52
14	645.9	659.1	672.2	685.0	697.6	710.0	722.2	734.1	745.9	757.4	0	56
15	646.1	659.3	672.4	685.2	697.8	710.2	722.4	734.3	746.1	757.6	1	00
16	646.3	659.6	672.6	685.4	698.0	710.4	722.6	734.5	746.3	757.8	1	04
17	646.6	659.8	672.8	685.6	698.2	710.6	722.8	734.7	746.4	757.9	1	08
18	646.8	660.0	673.0	685.8	698.4	710.8	723.0	734.9	746.6	758.1	1	12
19	647.0	660.2	673.2	686.0	698.6	711.0	723.2	735.1	746.8	758.3	1	16
20	647.2	660.4	673.4	686.2	698.8	711.2	723.4	735.3	747.0	758.5	1	20
21	647.5	660.7	673.7	686.5	699.0	711.4	723.6	735.5	747.2	758.7	1	24
22	647.7	660.9	673.9	686.7	699.2	711.6	723.8	735.7	747.4	758.9	1	28
23	647.9	661.1	674.1	686.9	699.4	711.8	724.0	735.9	747.6	759.1	1	32
24	648.1	661.3	674.3	687.1	699.7	712.0	724.2	736.1	747.8	759.3	1	36
25	648.3	661.5	674.5	687.3	699.9	712.2	724.4	736.3	748.0	759.5	1	40
26	648.6	661.7	674.7	687.5	700.1	712.4	724.6	736.5	748.2	759.6	1	44
27	648.8	662.0	674.9	687.7	700.3	712.6	724.8	736.7	748.4	759.8	1	48
28	649.0	662.2	675.2	687.9	700.5	712.8	725.0	736.9	748.6	760.0	1	52
29	649.2	662.4	675.4	688.1	700.7	713.0	725.2	737.1	748.8	760.2	1	56
30	649.4	662.6	675.6	688.4	700.9	713.3	725.4	737.3	749.0	760.4	2	00
31	649.7	662.8	675.8	688.6	701.1	713.5	725.6	737.5	749.1	760.6	2	04
32	649.9	663.1	676.0	688.8	701.3	713.7	725.8	737.7	749.3	760.8	2	08
33	650.1	663.3	676.2	689.0	701.5	713.9	726.0	737.9	749.5	761.0	2	12
34	650.3	663.5	676.4	689.2	701.7	714.1	726.2	738.1	749.7	761.2	2	16
35	650.6	663.7	676.7	689.4	701.9	714.3	726.4	738.3	749.9	761.3	2	20
36	650.8	663.9	676.9	689.6	702.2	714.5	726.6	738.5	750.1	761.5	2	24
37	651.0	664.1	677.1	689.8	702.4	714.7	726.8	738.7	750.3	761.7	2	28
38	651.2	664.4	677.3	690.0	702.6	714.9	727.0	738.9	750.5	761.9	2	32
39	651.4	664.6	677.5	690.3	702.8	715.1	727.2	739.0	750.7	762.1	2	36
40	651.7	664.8	677.7	690.5	703.0	715.3	727.4	739.2	750.9	762.3	2	40
41	651.9	665.0	677.9	690.7	703.2	715.5	727.6	739.4	751.1	762.5	2	44
42	652.1	665.2	678.2	690.9	703.4	715.7	727.8	739.6	751.3	762.7	2	48
43	652.3	665.4	678.4	691.1	703.6	715.9	728.0	739.8	751.5	762.9	2	52
44	652.5	665.7	678.6	691.3	703.8	716.1	728.2	740.0	751.6	763.0	2	56
45	652.8	665.9	678.8	691.5	704.0	716.3	728.4	740.2	751.8	763.2	3	00
46	653.0	666.1	679.0	691.7	704.2	716.5	728.6	740.4	752.0	763.4	3	04
47	653.2	666.3	679.2	691.9	704.4	716.7	728.8	740.6	752.2	763.6	3	08
48	653.4	666.5	679.4	692.1	704.6	716.9	729.0	740.8	752.4	763.8	3	12
49	653.6	666.7	679.7	692.4	704.8	717.1	729.2	741.0	752.6	764.0	3	16
50	653.3	667.0	679.9	692.6	705.0	717.3	729.4	741.2	752.8	764.2	3	20
51	654.1	667.2	680.1	692.8	705.3	717.5	729.6	741.4	753.0	764.4	3	24
52	654.3	667.4	680.3	693.0	705.5	717.7	729.8	741.6	753.2	764.5	3	28
53	654.5	667.6	680.5	693.2	705.7	717.9	730.0	741.8	753.4	764.7	3	32
54	654.7	667.8	680.7	693.4	705.9	718.1	730.2	742.0	753.6	764.9	3	36
55	655.0	668.0	680.9	693.6	706.1	718.3	730.4	742.2	753.8	765.1	3	40
56	655.2	668.3	681.1	693.8	705.3	718.5	730.6	742.4	753.9	765.3	3	44
57	655.4	668.5	681.4	694.0	706.5	718.7	730.8	742.6	754.1	765.5	3	48
58	655.6	668.7	681.6	694.2	706.7	718.9	731.0	742.8	754.3	765.7	3	52
59	655.8	668.9	681.8	694.4	706.9	719.1	731.2	743.0	754.5	765.9	3	56
	2.40 M.M	2,44 HM	2.48 HM	2.52 HM.	2.56 H.M	3.00 HM.	30.4 HM.	3.08 HM.	3.12 H.M	3.16 HM.		

Min.	Deg. 50	Deg. 51	Deg. 52	Deg. 53	Deg. 54	Deg. 55	Deg. 56	Deg. 57	Deg. 58	Deg. 59	Min	Sec.
0	766.0	777.1	788.0	798.6	809.0	819.2	829.0	838.7	848.0	857.2	0	00
1	766.2	777.3	788.2	798.8	809.2	819.3	829.2	838.8	848.2	857.3	0	04
2	766.4	777.5	788.4	799.0	809.4	819.5	829.4	839.0	848.4	857.5	0	08
3	766.6	777.7	788.5	799.2	809.5	819.7	829.5	839.1	848.5	857.6	0	12
4	766.8	777.9	788.7	799.3	809.7	819.8	829.7	839.3	848.7	857.8	0	16
5	767.0	778.1	788.9	799.5	809.9	820.0	829.9	839.5	848.8	857.9	0	20
6	767.2	778.2	789.1	799.7	810.0	820.2	830.0	839.6	849.0	858.1	0	24
7	767.4	778.4	789.3	799.9	810.2	820.3	830.2	839.8	849.1	858.2	0	28
8	767.5	778.6	789.4	800.0	810.4	820.5	830.3	839.9	849.3	858.4	0	32
9	767.7	778.8	789.6	800.2	810.6	820.7	830.5	840.1	840.4	858.5	0	36
10	767.9	779.0	789.8	800.4	810.7	820.8	830.7	840.3	849.6	858.7	0	40
11	768.1	779.2	790.0	800.6	810.9	821.0	830.8	840.4	849.7	858.8	0	44
12	768.3	779.3	790.2	800.7	811.1	821.1	831.0	840.6	849.9	859.0	0	48
13	768.5	779.5	790.3	800.9	811.2	821.3	831.1	840.7	850.0	859.1	0	52
14	768.7	779.7	790.5	801.1	811.4	821.5	831.3	840.9	850.2	859.3	0	56
15	768.8	779.9	790.7	801.3	811.6	821.6	831.5	841.0	850.4	859.4	1	00
16	769.0	780.1	790.9	801.4	811.7	821.8	831.6	841.2	850.5	859.6	1	04
17	769.2	780.2	791.0	801.6	811.9	822.0	831.8	841.4	850.7	859.7	1	08
18	769.4	780.4	791.2	801.8	812.1	822.1	832.0	841.5	850.8	859.9	1	12
19	769.6	780.6	791.4	801.9	812.3	822.3	832.1	841.7	851.0	860.0	1	16
20	769.8	780.8	791.6	802.1	812.4	822.5	832.3	841.8	851.1	860.1	1	20
21	770.0	781.0	791.8	802.3	812.6	822.6	832.4	842.0	851.3	860.3	1	24
22	770.1	781.2	791.9	802.5	812.8	822.8	832.6	842.1	851.4	860.4	1	28
23	770.3	781.3	792.1	802.6	812.9	823.0	832.8	842.3	851.6	860.6	1	32
24	770.5	781.5	792.3	802.8	813.1	823.1	832.9	842.5	851.7	860.7	1	36
25	770.7	781.7	792.5	803.0	813.3	823.3	833.1	842.6	851.9	860.9	1	40
26	770.9	781.9	792.6	803.2	813.4	823.5	833.2	842.8	852.0	861.0	1	44
27	771.1	782.1	792.8	803.3	813.6	823.6	833.4	842.9	852.2	861.2	1	48
28	771.3	782.2	793.0	803.5	813.8	823.8	833.6	843.1	852.3	861.3	1	52
29	771.4	782.4	793.2	803.7	813.9	824.0	833.7	843.2	852.5	861.5	1	56
30	771.6	782.6	793.4	803.9	814.1	824.1	833.9	843.4	852.6	861.6	2	00
31	771.8	782.8	793.5	804.0	814.3	824.3	834.0	843.5	852.8	861.8	2	04
32	772.0	783.0	793.7	804.2	814.5	824.5	834.2	843.7	852.9	861.9	2	08
33	772.2	783.2	793.9	804.4	814.6	824.6	834.4	843.9	853.1	862.1	2	12
34	772.4	783.3	794.1	804.5	814.8	824.8	834.5	844.0	853.2	862.2	2	16
35	772.5	783.5	794.2	804.7	815.0	824.9	834.7	844.2	853.4	862.4	2	20
36	772.7	783.7	794.4	804.9	815.1	825.1	834.8	844.3	853.6	862.5	2	24
37	772.9	783.9	794.6	805.1	815.3	825.3	835.0	844.5	853.7	862.7	2	28
38	773.1	784.1	794.8	805.2	815.5	825.4	835.2	844.6	853.9	862.8	2	32
39	773.3	784.2	794.9	805.4	815.6	825.6	835.3	844.8	854.0	863.0	2	36
40	773.5	784.4	795.1	805.6	815.8	825.8	835.5	845.0	854.2	863.1	2	40
41	773.7	784.6	795.3	805.8	816.0	825.9	835.6	845.1	854.3	863.2	2	44
42	773.8	784.8	795.5	805.9	816.1	826.1	835.8	845.3	854.5	863.4	2	48
43	774.0	785.0	795.6	806.1	816.3	826.3	836.0	845.4	854.6	863.5	2	52
44	774.2	785.1	795.8	806.3	816.5	826.4	836.1	845.6	854.8	863.7	2	56
45	774.4	785.3	796.0	806.4	816.6	826.6	836.3	845.7	854.9	863.8	3	00
46	774.6	785.5	796.2	806.6	816.8	826.8	836.4	845.9	855.1	864.0	3	04
47	774.8	785.7	796.4	806.8	817.0	826.9	836.6	846.0	855.2	864.1	3	08
48	774.9	785.9	796.5	807.0	817.1	827.1	836.8	846.2	855.4	864.3	3	12
49	775.1	786.0	796.7	807.1	817.3	827.2	836.9	846.3	855.5	864.4	3	16
50	775.3	786.2	796.9	807.3	817.5	827.4	837.1	846.5	855.7	864.6	3	20
51	775.5	786.4	797.1	807.5	817.6	827.6	837.2	846.7	855.8	864.7	3	24
52	775.7	786.6	797.3	807.6	817.8	827.7	837.4	846.8	856.0	864.9	3	28
53	775.9	786.8	797.4	807.8	818.0	827.9	837.6	847.0	856.1	865.0	3	32
54	776.0	786.9	797.6	808.0	818.1	828.1	837.7	847.1	856.3	865.2	3	36
55	776.2	787.1	797.8	808.2	818.3	828.2	837.9	847.3	856.4	865.3	3	40
56	776.4	787.3	797.9	808.3	818.5	828.4	838.0	847.4	856.6	865.4	3	44
57	776.6	787.5	798.1	808.5	818.7	828.5	838.2	847.6	856.7	865.6	3	48
58	776.8	787.7	798.3	808.7	818.8	828.7	838.4	847.7	856.9	865.7	3	52
59	777.0	787.8	798.5	808.8	819.0	828.9	838.5	847.9	857.0	865.9	3	56
	3:20 HM	3:24 HM	3:28 HM.	3:32 HM	3:36 HM	3:40 HM	3:44 HM	3:48 HM	3:52 HM	3:56 HM		

Min	Deg 60	Deg 61	Deg 62	Deg 63	Deg 64	Deg 65	Deg 66	Deg 67	Deg 68	Deg 69	Min	Sec
0	866.0	874.6	882.9	891.0	898.8	906.3	913.5	920.5	927.2	933.6	0	00
2	866.3	874.9	883.2	891.3	899.0	906.6	913.8	920.7	927.4	933.8	0	98
4	866.5	875.2	883.5	891.5	899.3	906.8	914.0	521.0	927.6	934.0	0	16
6	866.9	875.5	883.8	891.8	899.6	907.0	914.3	921.2	927.8	934.2	0	24
8	857.2	875.7	884.0	892.1	899.8	907.3	914.5	921.4	928.1	934.4	0	32
10	867.5	876.0	884.3	892.3	900.1	907.5	914.7	921.6	928.3	934.6	0	40
12	867.8	876.3	884.6	892.6	900.3	907.8	915.0	921.9	928.5	934.8	0	48
14	868.1	876.6	884.9	892.8	900.6	908.0	915.2	922.1	928.7	935.0	0	56
16	868.3	876.9	885.1	893.1	900.8	908.3	915.4	922.3	928.9	935.2	1	94
18	868.6	877.1	885.4	893.4	901.1	908.5	915.7	922.5	929.1	935.4	1	12
20	868.9	877.4	885.7	893.6	901.3	908.8	915.9	922.8	929.3	935.6	1	20
22	869.2	877.7	885.9	893.9	901.6	909.0	916.1	923.0	929.6	935.9	1	28
24	869.5	878.0	886.2	894.2	901.8	909.2	916.4	923.2	929.8	936.1	1	36
26	869.8	878.3	886.5	894.4	902.1	909.5	916.6	923.4	930.0	936.3	1	44
28	870.1	878.5	886.7	894.7	902.3	909.7	916.8	923.7	930.2	936.5	1	52
30	870.4	878.8	887.0	894.9	902.6	910.0	917.1	923.9	930.4	936.7	2	00
32	870.6	879.1	887.3	895.2	902.8	910.2	917.3	924.1	930.6	936.9	2	08
34	870.9	879.4	887.5	895.4	903.1	910.4	917.5	524.3	930.8	937.1	2	16
36	871.2	879.6	887.8	895.7	903.3	910.7	917.8	924.5	931.1	937.3	2	24
38	871.5	879.9	888.1	896.0	903.6	910.9	918.0	924.8	931.3	937.5	2	32
40	871.8	880.2	888.4	896.2	903.8	911.2	918.2	925.0	931.5	937.7	2	40
42	872.1	880.5	888.6	896.5	904.1	911.4	918.4	925.2	931.7	937.9	2	48
44	872.4	880.8	888.9	896.7	904.3	911.6	918.7	925.4	931.9	938.1	2	56
46	872.6	881.9	889.2	897.0	904.6	911.9	918.9	925.7	932.1	938.3	3	04
48	872.9	881.3	889.4	897.3	904.8	912.1	919.1	925.9	932.3	938.5	3	12
50	873.2	881.6	889.7	897.5	905.1	912.4	919.4	926.1	932.5	938.7	3	20
52	873.5	881.9	889.9	897.8	905.3	912.6	919.6	926.3	932.7	938.9	3	28
54	873.8	882.1	890.2	898.0	905.6	912.8	919.8	926.5	933.0	939.1	3	36
56	874.1	882.4	890.5	898.3	905.8	913.1	920.0	926.7	933.2	939.3	3	44
58	874.3	882.7	890.7	898.5	906.1	913.3	920.3	927.0	933.4	939.5	3	52
	4:00 HM	4:04 HM	4 08 HM	4:12 HM	4:16 HM	4:20 HM	4:24 HM	4:28 HM	4:32 HM	4:36 HM		

Min	Deg 70	Deg 71	Deg 72	Deg 73	Deg 74	Deg 75	Deg 76	Deg 77	Deg 78	Deg 79	Min.	Sec.
0	939.7	945.3	951.1	956.3	961.3	965.9	970.3	974.4	978.1	981.6	0	00
3	940.0	945.8	951.3	956.6	961.5	966.2	970.5	974.6	978.3	981.8	0	12
6	940.3	946.1	951.6	956.8	961.7	966.4	970.7	974.8	978.5	982.0	0	24
9	940.6	946.4	951.9	957.1	962.0	966.6	970.9	975.0	978.7	982.1	0	36
12	940.9	946.6	552.1	957.3	962.2	966.8	971.1	975.1	978.9	982.3	0	48
15	941.2	946.9	952.4	957.6	962.5	967.0	971.3	975.3	979.0	982.5	1	00
18	941.5	947.2	952.7	957.8	962.7	967.3	971.5	975.5	979.2	982.6	1	12
21	941.8	947.5	952.9	958.1	962.9	967.5	971.8	975.7	979.4	982.8	1	24
24	942.1	947.8	953.2	958.3	963.2	967.7	972.0	975.9	979.6	982.9	1	36
27	942.3	948.0	953.5	958.6	963.4	967.9	972.2	976.1	979.8	983.1	1	48
30	942.6	948.3	953.7	958.8	963.6	968.1	972.4	976.3	979.9	983.3	2	00
33	942.9	948.6	954.0	959.1	963.9	968.4	972.6	976.5	980.1	983.4	2	12
36	943.2	948.9	954.2	959.3	964.1	968.6	972.8	976.7	980.3	983.6	2	24
39	943.5	949.2	954.5	959.6	964.3	968.8	973.0	976.9	980.4	983.7	2	36
42	943.8	949.4	954.8	959.8	964.6	969.0	973.2	977.0	980.6	983.9	2	48
45	944.1	949.7	955.0	960.0	964.8	969.2	973.4	977.2	980.8	984.0	3	00
48	944.4	950.0	955.3	960.3	965.0	969.4	973.6	977.4	981.0	984.2	3	12
51	944.7	950.2	955.5	960.5	965.2	969.7	973.8	977.6	981.1	984.3	3	24
54	914.9	850.5	955.8	960.8	965.5	969.9	974.0	977.8	981.3	984.5	3	36
57	945.2	950.8	956.0	961.0	965.7	970.1	974.2	978.0	981.5	984.7	3	48
	4:40 HM	4:44 HM	4:48 HM	4:52 HM	4:56 HM	5:00 HM	5:04 HM	5:08 HM	5: 12 HM	5:16 HM		

Min	Deg. 80	Deg. 81	Deg. 82	Deg. 83	Deg. 84	Deg. 85	Deg. 86	Deg. 87	Deg. 88	Deg. 89	Min.	Sec.
0	984.8	987.7	990.3	992.5	994.5	996.2	997.6	998.6	999.4	999.8	0 .	00
4	985.0	987.9	990.4	992.7	994.6	996.3	997.6	998.7	999.4	999.9	0 .	16
8	985.2	988.0	990.6	992.8	994.8	996.4	997.7	998.7	999.5	999.9	0 .	32
12	985.4	988.2	990.7	993.0	994.9	996.5	997.8	998.8	999.5	999.9	0 .	48
16	985.6	988.4	990.9	993.1	995.0	996.6	997.9	998.9	999.5	999.9	1 .	04
20	985.8	988.6	991.1	993.2	995.1	996.7	998.0	998.9	999.6	999.9	1 .	20
24	986.0	988.8	991.2	993.4	995.2	996.8	998.0	999.0	999.6	999.9	1 .	36
28	986.2	988.9	991.4	993.5	995.3	996.9	998.1	999.0	999.6	1000.0	1 .	52
32	986.4	989.1	991.5	993.6	995.4	997.0	998.2	999.1	999.7	1000.0	2 .	08
36	986.6	989.3	991.7	993.8	995.6	997.1	998.2	999.1	999.7	1000.0	2 .	24
40	986.8	989.4	991.8	993.9	995.7	997.1	998.3	999.6	999.7	1000.0	2 .	40
44	986.9	989.6	992.0	994.0	995.8	997.2	998.4	999.6	999.8	1000.0	2 .	56
48	987.1	989.8	992.1	994.2	995.9	997.3	998.4	999.6	999.8	1000.0	3 .	12
52	987.3	989.9	992.3	994.3	996.0	997.4	998.5	999.7	999.8	1000.0	3 .	28
56	987.5	990.1	992.4	994.4	996.1	997.5	998.6	999.7	999.8	1000.0	3 .	44
	5:20 HM	5:24 HM	5:28 HM	5:32 HM	2:36 HM	2:40 HM	2:44 HM	2:48 HM	2:52 HM	5 : 56 H M		

The Explanation of the foregoing Table of Natural Sines.

At the Head of each Page are the Degrees of the Quadrant, in the left hand Column of each Page are the Minutes of a Degree, as far as 60 Degrees; from 60 to 70 Degrees you have in the ſame Columns every ſecond Minute of a Degree; from 70 to 80 Degrees, are every third Minute of a Degree; and from 80 to 90 Degrees, you have every fourth Minute of a Degree.

At the Foot of every Table are the Hours and Minutes of Time anſwering to the Degrees, at the Head of each Column in that Table, and in the Right-hand Column of each Table are the Minutes and Seconds in Time, anſwering to the Minutes of a Degree, in the Left-hand Columns. So have you readily reduced, the Hours, Minutes, and Seconds of Time, anſwering to every Minute, as far as 60 Degrees; to every 2 Minutes as far as 70 Degrees; to every 3, as far as 80; and to every 4, as far as 90; which is ſufficient for any Practice uſeful at Sea.

The following Table is a Table of *Natural Tangents*, to every Minute of the Sun's Declination, which is ſo eaſy to be underſtood, it needs no Explanation.

Minutes

Min	Deg. 0	Deg. 1	Deg. 2	Deg. 3	Deg. 4	Deg. 5	Deg. 6	Deg. 7	Deg. 8	Deg. 9	Deg. 10	Deg. 11
0	00.0	17.5	34.9	52.4	69.9	87.5	105.1	122.8	140.5	158.4	176.3	194.4
1	00.3	17.7	35.2	52.7	70.2	87.8	105.4	123.1	140.8	158.7	176.6	194.7
2	00.6	18.0	35.5	53.0	70.5	88.1	105.7	123.4	141.1	159.0	176.9	195.0
3	00.9	18.3	35.8	53.3	70.8	88.4	106.0	123.7	141.4	159.3	177.2	195.3
4	01.2	18.6	36.1	53.6	71.1	88.7	106.3	124.0	141.7	159.6	177.5	195.6
5	01.5	18.9	36.4	53.9	71.4	89.0	106.6	124.3	142.0	159.9	177.8	195.9
6	01.7	19.2	36.7	54.2	71.7	89.2	106.9	124.6	142.3	160.2	178.1	196.2
7	02.0	19.5	37.0	54.4	72.0	89.5	107.2	124.9	142.6	160.5	178.4	196.5
8	02.3	19.8	37.3	54.7	72.3	89.8	107.5	125.1	142.9	160.8	178.7	196.8
9	02.6	20.1	37.5	55.0	72.6	90.1	107.8	125.4	143.2	161.1	179.0	197.1
10	02.9	20.4	37.8	55.3	72.9	90.4	108.0	125.7	143.5	161.4	179.3	197.4
11	03.2	20.7	38.1	55.6	73.1	90.7	108.3	126.0	143.8	161.7	179.6	197.7
12	03.5	20.9	38.4	55.9	73.4	91.0	108.6	126.3	144.1	162.0	179.9	198.0
13	03.8	21.2	38.7	56.2	73.7	91.3	108.9	126.6	144.4	162.3	180.2	198.3
14	04.1	21.5	39.0	56.5	74.0	91.6	109.2	126.9	144.7	162.6	180.5	198.6
15	04.4	21.8	39.3	56.8	74.3	91.9	109.5	127.2	145.0	162.9	180.8	198.9
16	04.7	22.1	39.6	57.1	74.6	92.2	109.8	127.5	145.3	163.2	181.1	199.2
17	04.9	22.3	39.9	57.4	74.9	92.5	110.1	127.8	145.6	163.5	181.4	199.5
18	05.2	22.7	40.2	57.7	75.2	92.8	110.4	128.1	145.9	163.8	181.7	199.8
19	05.5	23.0	40.5	58.0	75.5	93.1	110.7	128.4	146.2	164.1	182.0	200.1
20	05.8	23.3	40.7	58.2	75.8	93.4	111.0	128.7	146.5	164.4	182.3	200.4
21	06.1	23.6	41.0	58.5	76.1	93.6	111.3	129.0	146.8	164.7	182.6	200.7
22	06.4	23.9	41.3	58.8	76.4	93.9	111.6	129.3	147.	165.0	182.9	201.0
23	06.7	24.1	41.6	59.1	76.7	94.2	111.9	129.6	147.4	165.3	183.2	201.3
24	07.0	24.4	41.9	59.4	76.9	94.5	112.2	129.9	147.7	165.5	183.5	201.6
25	07.3	24.7	42.2	59.7	77.2	94.8	112.5	130.2	148.0	165.8	183.8	201.9
26	07.6	25.0	42.5	60.0	77.5	95.1	112.8	130.5	148.3	166.1	184.1	202.2
27	07.9	25.3	42.8	60.3	77.8	95.4	113.1	130.8	148.6	166.4	184.4	202.5
28	08.1	25.6	43.1	60.6	78.1	95.7	113.3	131.1	148.9	166.7	184.7	202.8
29	08.4	25.9	42.4	60.9	78.4	96.0	113.6	131.4	149.2	167.0	185.0	203.1
30	08.7	26.2	43.7	61.2	73.7	96.3	113.9	131.7	149.5	167.3	185.3	203.5
31	09.0	26.5	44.0	61.5	79.0	96.6	114.2	131.9	149.7	167.6	185.6	203.8
32	09.3	26.8	44.2	61.7	79.3	96.9	114.5	132.2	150.0	167.9	185.9	204.1
33	09.6	27.1	44.5	62.0	79.6	97.2	114.8	132.5	150.3	168.2	186.2	204.4
34	09.9	27.4	44.8	62.3	79.9	97.5	115.1	132.8	150.6	168.5	186.5	204.7
35	10.2	27.6	45.1	62.6	80.2	97.8	115.4	133.1	150.9	168.8	186.8	205.0
36	10.5	27.9	45.4	62.9	80.5	98.1	115.7	133.4	151.2	169.1	187.1	205.3
37	10.8	28.2	45.7	63.2	80.8	98.3	116.0	133.7	151.5	169.4	187.4	205.6
38	11.1	28.5	46.0	63.5	81.0	98.6	116.3	134.0	151.8	169.7	187.7	205.9
39	11.3	28.8	46.3	63.8	81.3	98.9	116.6	134.3	152.1	170.0	188.0	206.2
40	11.6	29.1	46.6	64.1	81.6	99.2	116.9	134.6	152.4	170.3	188.3	206.5
41	11.9	29.4	46.9	64.4	81.9	99.5	117.2	134.9	152.7	170.6	188.6	206.8
42	12.2	29.7	47.2	64.7	82.2	99.8	117.5	135.2	153.0	170.9	188.9	207.1
43	12.5	30.0	47.5	65.0	82.5	100.1	117.8	135.5	153.3	171.2	189.2	207.4
44	12.8	30.3	47.7	65.3	82.8	100.4	118.1	135.8	153.6	171.5	189.5	207.7
45	13.1	30.6	48.0	65.5	83.1	100.7	118.4	136.1	153.9	171.8	189.8	208.0
46	13.4	30.8	48.3	65.8	83.4	101.0	118.7	136.4	154.2	172.1	190.2	208.3
47	13.7	31.1	48.6	66.1	83.7	101.3	118.9	136.7	154.5	172.4	190.5	208.6
48	14.0	31.4	48.9	66.4	84.0	101.6	119.2	137.0	154.8	172.7	190.8	208.9
49	14.3	31.7	49.2	66.7	84.3	101.9	119.5	137.3	155.1	173.0	191.1	209.2
50	14.5	32.0	49.5	67.0	84.6	102.2	119.8	137.6	155.4	173.3	191.4	209.5
51	14.8	32.3	49.8	67.3	84.9	102.5	120.1	137.9	155.7	173.6	191.7	209.8
52	15.1	32.6	50.1	67.6	85.1	102.8	120.4	138.2	156.0	173.9	192.0	210.1
53	15.4	32.9	50.4	67.9	85.4	103.0	120.7	138.5	156.3	174.2	192.3	210.4
54	15.7	33.2	50.7	68.2	85.7	103.3	121.0	138.8	156.6	174.5	192.6	210.7
55	16.0	33.5	50.9	68.5	86.0	103.6	121.3	139.1	156.9	174.8	192.9	211.0
56	16.3	33.8	51.2	68.8	86.3	103.9	121.6	139.4	157.2	175.1	193.2	211.3
57	16.6	34.0	51.5	69.0	86.6	104.2	121.9	139.7	157.5	175.4	193.5	211.6
58	16.9	34.3	51.8	69.3	86.9	104.5	122.2	140.0	157.8	175.7	193.8	211.9
59	17.2	34.6	52.1	69.6	87.2	104.8	122.5	140.2	158.0	176.0	194.1	212.3

Min	Deg 12	Deg 13	Deg 14	Deg 15	Deg 16	Deg 17	Deg 18	Deg 19	Deg 20	Deg 21	Deg 22	Deg 23
0	212.6	230.9	249.3	267.9	286.7	305.7	324.9	344.3	364.0	383.9	404.0	424.5
1	212.9	231.2	249.6	268.3	287.1	306.0	325.2	344.7	364.3	384.2	404.4	424.8
2	213.2	231.5	249.9	268.6	287.4	306.4	325.6	345.0	364.6	384.5	404.7	425.2
3	213.5	231.8	250.3	258.9	287.7	306.7	325.9	345.3	365.0	384.9	405.0	425.5
4	213.8	232.1	250.6	269.2	288.0	307.0	326.2	345.6	365.3	385.2	405.4	425.8
5	214.1	232.4	250.9	269.5	288.3	307.3	326.5	346.0	365.6	385.5	405.7	426.2
6	214.4	232.7	251.2	269.8	288.6	307.6	326.9	346.3	366.0	385.9	406.1	426.5
7	214.7	233.0	251.5	270.1	289.0	308.0	327.2	346.6	366.3	386.2	406.4	426.9
8	214.0	233.3	251.8	270.4	289.3	308.3	327.5	346.9	366.6	386.5	406.7	427.2
9	215.3	233.6	252.1	270.8	289.6	308.6	327.8	347.3	366.9	386.9	407.1	417.6
10	215.6	233.9	252.4	271.1	289.9	308.9	328.1	347.6	367.3	387.2	407.4	427.9
11	215.9	234.2	252.7	271.4	290.2	309.2	328.5	347.9	367.5	387.5	407.8	428.3
12	216.2	234.5	253.0	271.7	290.5	309.6	328.8	348.2	367.9	387.9	408.1	428.6
13	216.5	234.9	253.3	272.0	290.8	309.9	329.1	348.6	368.3	388.2	408.4	428.9
14	217.8	235.2	253.7	272.3	291.2	310.2	329.4	348.9	368.6	388.5	408.8	429.3
15	217.1	235.5	254.0	272.6	291.5	310.5	329.8	349.2	368.9	388.9	409.1	429.6
16	217.4	235.8	254.3	272.9	291.8	310.8	330.1	349.5	369.3	389.2	409.5	430.0
17	217.7	236.1	254.6	273.3	292.1	311.1	330.4	349.6	369.6	389.5	409.8	430.3
18	218.0	236.4	254.9	273.6	292.4	311.5	330.7	350.2	369.9	389.9	410.1	430.7
19	218.3	236.7	255.2	273.9	292.7	311.8	331.0	350.5	370.2	490.2	410.5	431.0
20	218.6	237.0	255.5	274.2	293.1	312.1	331.4	350.8	370.6	390.6	410.8	431.4
21	218.9	237.3	255.8	274.5	293.4	312.4	331.7	351.2	370.9	390.9	411.1	431.7
22	219.2	237.6	256.1	274.8	293.7	312.7	332.0	351.5	371.2	391.2	411.5	432.0
23	219.5	237.9	256.4	275.1	294.0	313.0	332.3	351.8	371.6	391.6	411.8	432.4
24	219.8	238.	256.8	275.4	294.3	313.4	332.7	352.2	371.9	391.9	412.2	432.7
25	220.2	238.5	257.1	275.8	294.6	313.7	333.0	352.5	372.2	392.2	412.5	433.1
26	220.5	238.8	257.4	276.1	294.9	314.0	333.3	352.8	372.6	392.6	412.9	433.4
27	220.8	239.2	257.7	276.4	295.3	314.3	333.6	353.1	372.9	392.9	413.2	433.8
28	221.1	239.5	258.0	276.7	295.6	314.7	333.9	353.5	373.2	393.2	413.5	434.1
29	221.4	239.	258.3	277.0	295.9	315.0	334.3	353.8	373.6	393.6	413.9	434.5
30	221.7	240.1	258.6	277.3	296.2	315.3	334.6	354.1	373.9	393.9	414.2	
31	222.0	240.4	258.9	277.6	296.5	315.6	334.9	354.4	374.2	394.2	414.6	
32	222.3	240.7	259.2	278.0	296.8	315.9	335.2	354.8	374.5	594.6	414.9	
33	222.6	241.0	259.5	278.3	297.2	316.3	335.6	355.1	374.9	394.9	415.2	
34	222.9	241.3	259.9	278.6	297.5	316.6	335.9	355.4	375.2	395.3	415.6	
35	223.2	241.6	260.2	278.9	297.8	316.9	336.2	355.8	375.5	395.6	415.9	
36	223.5	241.9	260.5	279.2	298.1	317.2	336.5	356.1	375.9	395.9	416.3	
37	223.8	242.2	260.8	279.5	298.4	317.5	336.9	356.4	376.2	396.3	416.6	
38	224.1	242.5	261.1	279.8	298.7	317.9	337.2	356.7	376.5	396.6	416.9	
39	224.4	242.8	261.4	280.1	299.1	318.2	337.5	357.1	376.9	396.9	417.3	
40	224.7	243.2	261.7	280.5	299.4	318.5	337.8	357.4	377.2	397.3	417.6	
41	225.1	243.5	262.0	280.8	299.7	318.9	338.2	357.7	377.5	397.6	418.0	
42	225.4	243.8	262.3	281.1	300.0	319.1	338.5	358.1	377.9	397.9	418.3	
43	225.7	244.1	262.7	281.4	300.3	319.5	338.8	358.4	378.2	398.3	418.7	
44	226.0	244.4	263.0	281.7	300.6	319.8	339.1	358.7	378.5	398.6	419.0	
45	226.3	244.7	263.3	282.0	301.0	320.1	339.5	359.0	378.9	399.0	419.3	
46	226.6	245.0	263.6	282.3	301.3	320.4	339.8	359.4	379.2	399.3	419.7	
47	226.9	245.3	263.9	282.7	301.6	320.7	340.1	359.7	379.5	399.6	420.0	
48	227.2	245.6	264.2	283.0	301.9	321.1	340.4	360.0	379.9	400.0	420.4	
49	227.5	245.9	264.5	283.3	302.2	321.4	340.7	360.4	380.2	400.3	420.7	
50	227.8	246.2	264.8	283.6	302.6	321.7	341.1	360.7	380.5	400.7	421.0	
51	228.1	246.5	265.1	283.9	302.9	322.0	341.4	361.0	380.9	401.0	421.4	
52	228.4	246.9	265.5	284.2	303.2	322.3	341.7	361.3	381.2	401.3	421.7	
53	228.7	247.2	265.8	284.5	303.5	322.7	342.	361.6	381.5	401.7	422.1	
54	229.0	247.5	266.1	284.9	303.8	323.0	342.4	362.0	381.9	402.0	422.4	
55	229.3	247.8	266.4	285.2	304.1	323.3	342.7	362.3	382.2	402.3	422.8	
56	229.6	248.1	266.7	285.5	304.5	323.6	343.0	362.7	382.5	402.7	423.1	
57	229.9	248.4	267.0	285.8	304.8	324.0	343.4	363.0	382.9	403.0	423.4	
58	230.3	248.7	267.3	286.1	305.1	324.3	343.7	363.3	382.2	403.3	423.8	
59	230.6	249.0	267.6	286.4	305.4	324.6	344.0	363.6	383.5	403.7	424.1	

PROBLEM IV.

The Latitude of the Place, and the Sun's Declination given, to find the Sun's true Amplitude, with the Time of its riſing and ſetting; the Sun's Altitude and Azimuth, at ſix in the Morning and Evening, the Sun's Altitude and Hour of the Day at Eaſt and Weſt.

Rule. Find the neareſt Degree and Minute to the Latitude, at the Head or Foot of the Traverſe Table, and the *Natural Sine* and *Tangent* of the Sun's Declination, in the Difference of Latitude Column; take the Diſtance anſwering to the Sine, and the Departure to the Tangent; again, find the Sine and Tangent of the Sun's Declination in the Departure Column, take the Diſtance anſwering to the Sine, and the Difference of Latitude to the Tangent; and again, find the Sine of the Sun's Declination in the Diſtance Column, take the Departure anſwering thereto. Of theſe five Numbers thus found, the firſt is the Natural Sine of the Sun's true Amplitude, the ſecond is the Natural Sine of its Difference of Aſcenſion, which you may take in Hours, Minutes and Seconds of Time; the third is the Sun's Altitude at Eaſt and Weſt; the fourth is the time after 6 that the Sun is Eaſt, and the time before 6 it is at Weſt; the fifth is the Natural Sine of the Sun's Altitude at 6 in the Morning and Evening, whoſe Tangent you muſt find in the ſaid Departure Column, the Difference of Latitude anſwering thereto, is the Natural Sine of the Sun's Azimuth at 6.

Example.

Let the Latitude of the Place be 42 : 11 North, the Sun's Declination 20 : 15 North, what's the Sun's true Amplitude, the time of its Riſing and Setting, the Sun's Altitude and Azimuth at 6 in the Morning and Evening; the Sun's Altitude, and Hour of the Day at Eaſt and Weſt?

The Operation.

Latitude 42:11 N. Sun's Declin. 20:15 N.

		Nat. Sines	
The Nat. Sine of the Sun's Decl.	346.1 —	467.0 —	27:50 Amplitude
The Nat. Tan. of the Sun'sDecl.	368.9 —	334.4 —	1:18:08 Diff. Aſcenſion
		516.1	31:04 Altitude at Eaſt
		406.5	1:35:56 time from 6.
		232.1	13:25 Altitude at 6.

The Tangent of the Sun's Altitude at 6 238.5 — 262.8 is the Natural Sine of the Sun's Azimuth at 6, *viz.* 15 : 14. This *Operation* is ſo plain and eaſy, that any one may underſtand it; but for thoſe that will not give themſelves the Trouble of conſidering the foregoing Figure in *Aſtronomy*, to ſtrengthen their Memory, I preſcribe theſe Notes.

When the Declination is North, the Sun always riſes to the Northward of the Eaſt, and ſets to the Northward of the Weſt; but when the Declination is South, it riſes to the Southward of the Eaſt, and ſets to the Southward of the Weſt; and therefore in our *Example* the Sun's true Amplitude is Eaſt 27 : 50 North at Riſing, and Weſt 27 : 50 North at Setting.

If the Latitude and Declination are both of the ſame Denomination, the Sun riſeth before 6, and ſets after 6; but if they are of different Names, the Sun riſeth after and ſetteth before 6; and therefore in our *Example* 1h. 18m. 8ſ. the Sun's Difference of Aſcenſion muſt be taken from 6 Hours, for the Sun's riſing, and added to 6 Hours for its ſetting; and therefore you will find by this *Example*, the Sun to riſe 41 : 52 paſt 4, and to ſet 18 : 08 paſt 7.

The Altitude at Eaſt and Weſt, is how high or how many Degrees and Minutes the Sun is then above the Horizon, which in our *Example* is 31 : 04, the Sun is never above the Horizon upon the Eaſt point of the Compaſs till after 6, and always upon the W. Point before 6; therefore the time from 6 at Eaſt and Weſt, muſt be always added to 6 for the Hour at Eaſt, and taken from 6, for the Hour at Weſt; and therefore in this *Exumple* at 7h. 35m. 56ſ. the Sun is Eaſt, and at 4h. 24m. 04ſ. the Sun is Weſt.

Note, the Sun's Altitude and Azimuth at 6 ſhould be ſound, before its Altitude and Hour at Eaſt; but to make the Rule and Operation the eaſier, I have ſound the latter before the former, which I hope is excuſable.

If the Latitude and Declination are of different Denominations, the Sun is under the Horizon at 6, and at Eaſt and Weſt, and therefore of no Service to us; but if they are of the ſame Name, *viz.* both North or both South, you have by the Example, the Sun's Altitude, which is 13 : 25 high at 6: And if the Declination is North, the Azimuth in the Morning is Eaſt Northerly, in the Evening Weſt Northerly; if the Sun's Declination is South, the Azimuth at 6 in the Morning is Eaſt Southerly, and at 6 in the Evening Weſt Southerly; and therefore in our Example the Sun's Azimuth at 6 in the Morning is Eaſt 15 : 14 North, and at 6 in the Evening its Azimuth is Weſt 15 : 14 North. I think I have ſaid enough on this *Problem*, let us now proceed to

PROBLEM V.

The Sun in the Equinoctial, the Latitude of the Place, and the Sun's Altitude given, to find the Hour and Azimuth.

Rule. Find the neareſt Degree and Minute to the Latitude at the Head or Foot of the *Traverſe Table*, and the *Natural Sine* and *Tangent* of the Sun's Altitude in the Difference of Latitude Column, take the Diſtance anſwering the Sine and the Departure to the Tangent; the firſt of theſe is the *Natural Sine* of the Hour from 6, the ſecond is the *Natural Sine* of the Sun's Azimuth.

Example.

Let the Latitude of the Place be 40 : 26 North, the Sun's Altitude 14 : 20, the Sun being in the Equinoctial, what is the Hour of the Day and the Sun's Azimuth?

The Operation.

Latitude 40 : 26 N. Sun's Altit. 14:20

Nat. Sine

Nat. Sine of the Sun's Altitude 247.6—324.7—1h. 15m. 48ſ. time from 6,
Nat. Tan. of the Sun's Altitude 255.5—217.8—12 : 35 Sun's Azimuth.

Note, The Time thus found muſt be added to 6 Hours in the Forenoon, and taken from 6 Hours in the Afternoon for the true time of the Day. And if the Latitude is North, the Azimuth is Eaſt Southerly in the Morning, and Weſt Southerly in the Evening; if the Latitude is South the Azimuth is Eaſt Northerly in the Forenoon, and Weſt Northerly in the Afternoon. For in the foregoing Figure, ſuppoſe the Sun at m, then is m n the Sun's Altitude; G m the Hour from 6, becauſe the Sun is at G at 6, and G n is the Azimuth from G, which is the Eaſt in the Morning and Weſt in the Evening, towards H, which is always the South; and therefore in this *Example* at 7h. 15m. 48ſ. in the Morning, the Sun's Azimuth is Eaſt 12 : 35, South, and at 4 : 44 : 12 in the Afternoon, the Sun's Azimuth is Weſt 12 : 35 Southerly.

PROBLEM VI.

To find the Sun's Meridian Altitude, having the Latitude of the Place and the Sun's Declination given.

Rule. If the Latitude and Declination are of the ſame Name, the Complement of the Latitude added to the Declination is the Sun's Meridian Altitude; but if they are of different Names, then the Declination taken from the Complement of the Latitude leaves the Meridian Altitude; for by the ſame Scheme HÆ and ÆA is the Sun's Meridian Altitude at A, and H Æ leſs Æ a is the Sun's Meridian Altitude at a; this is ſo plain it needs no *Example*. This *Problem* is uſeful at Sea in fixing the Shade Vane of your Quadrant at Noon before Obſervation, and in

PROBLEM VII.

The Latitude of the Place and the Sun's Declination given, to find the Sun's Altitude at any Hour of the Day.

Rule. Find the Sun's Meridian Altitude, and Altitude at 6, then from the Natural Sine of the Sun's Meridian Altitude, take the Natural Sine of the Sun's Altitude at 6, find the neareſt Number to this Remainder, againſt 100 in the Diſtance Column (in the *Traverſe Table*) find the Natural Sines of the given Times from 6 in the Diſtance Column, the Numbers anſwering thereto (in the Column where the foregoing Difference is found) added to the Natural Sine of the Sun's Altitude at 6, is the Natural Sine of the Sun's Altitude at that time, when the Latitude and Declination are of the ſame Name; but when they are different, the Natural Sine of the Sun's Meridian Altitude, added to the Natural Sine of the Sun's Depreſſion at 6, this Sum find oppoſite to 100, and in the Diſtance Column find the Natural Sines of the time from 6, the Numbers anſwering thereto, (in the Column where the foregoing Sum is found) made leſs by the Natural Sine of the Sun's Depreſſion, leaves the Natural Sine of the Sun's Altitude at that time.

Note, The Sun is as far below the Horizon at 6 in the Morning and Evening when the Latitude and Declination are different, as it is above the Horizon at 6 when they are alike.

Example. Let the Latitude of the Place be 45 : 00 North, the Sun's Declination 22 : 30 North, what is the Sun's Altitude at 6, 7, 8, 9, 10, 11, and at Noon?

The Operation.

Latitude 45 : 00 North, Sun's Declination 22 : 30 North

The Sun's Meridian Altitude 67 : 30 — 382.7 the N. S. of the Sun's Dec.
The Natural Sine thereof 923.9 — 270.9 is the Nat. S. of the Sun's [Alt. at 6.
Subtract ——— 270.9

653.0 find this Number againſt 100 in the Diſtance Column; then for

h.		h.	Nat.S.			Nat. S.	D.	M.		h.	h.
7	from Six	1	258.8	gives 168.8	add	439.7	26	05	the	7	5
8		2	500.0	326.5	the	597.4	36	41	Sun's	8	4
9		3	707.1	461.6	N.S.	732.5	47	06	Alti-	9 A.M.	3 P.M.
10		4	866.0	565.9	at	836.8	56	48	tude	10	2
11		5	965.9	630.9	Six.	901.8	64	24	at	11	1

Note A.M. ſignifies *Ante Merid.* or Forenoon, P. M. *Poſt Merid.* or Afternoon.

This is a uſeful *Problem* to try your Half-hour, Hour and Half watch Glaſſes, for which Reaſon I here inſerted it.

PROBLEM VIII.

The Latitude of the Place, the Sun's Declination and Altitude given; to find the Hour of the Day.

Rule. Find the Sun's Meridian Altitude, the Altitude at 6, and the Difference of their Natural Sines, againſt 100 in the Diſtance Column in the *Traverſe Table*; in the ſame Column where this Difference is found, find the Difference between the Natural Sine of the Sun's Altitude, and the Natural Sine of its Altitude at 6, the Diſtance anſwering thereto, is the Natural Sine of the Time from 6.

See the *Example* and its *Operation*.

Latitude 41:50 N. Sun's Dec. 15:24 N. Sun's Alt. 45:40, what is hour of Day

Comp. Lat. 48:10 265.6—176.7 N S. at 6, 715.3 N. S. Sun's Alt.
176.7 N. S. Sun at 6 ſub.

Mer. Alt. 63:34 N. S. 895.4
Nat. S. Sun at 6 ſub. 176.7
538.6 Diſt. anſw. hereto is 747.8, which is the Natural Sine of 3h, 13m. 36ſ.
718.7

and therefore it is 13m. 36ſ. paſt Nine in the Morning, and 46m. 24ſ. paſt Two in the Afternoon.

PROBLEM IX.

The Latitude of the Place, the Sun's Declination and Altitude given, to find the Sun's Azimuth.

Rule, Find the Hour of the Day by *Problem* 8, then with a Table of Artificial Sines, find the Sun's Azimuth by this Proportion;

As the Co-ſine of the Altitude,
Is to the Co-ſine of the Hour from Six;
So is the Co-ſine of the Declination,
To the Sine of the Azimuth from the North or South.

By the Sun's Altitude you may readily know whether the Sun is on the North or South ſide of the Plain of the Prime Vertical or Azimuth of Eaſt and Weſt, and conſequently whether the Azimuth thus found is from the North, or from the South towards the Eaſt and Weſt.

Example.

Let the Latitude of the Place be be 42 : 11 North, the Sun's Declination 8 : 34 North, what is the Sun's Azimuth, when the Sun's Altitude is 2 : 15, 3 : 20, 5 : 10, 6 : 30, and 8 : 40, in the Morning.

Operation.

Latit. 42:11 N. Sun's Declin. 8:34 N.

Co.Lat. 47:49 149.0—100.0. is N. Sine of the Sun's Alt at 6.

Sun's Mer. Alt. 56:23 N. Sine 832.8
Subtract—100.0
732.8

39.3 ſubt. the N. Sines given Altit.
58.1
90.1
113.2
150.7 gives
60.7, 41.9, 9.9, 13.2, 50.7 found againſt 732.8 oppoſite 100, gives

83.0, 57.3, 13.5 the Nat Sine of the Time before 6.
18.0, 69.3 after Six.

which are in Degrees and Minutes, becauſe we ſhall uſe them in the following Canons 4 : 46, 3 : 16, 0 : 46, 1 : 02, 3 : 58; and now,

As the Co ſine of the Sun's Altitude,
Is to the Co ſine of the Hour before Six;
So is the Co-ſine of the Sun's Declination,
To the Sine of the Sun's Azimuth.

2:15	0.000334	3:20	0.000734	5:10	0.001767	6:30	0.002800	8:40	0.004986
4:46	9.998495	3:16	9,999294	0:46	9.999961	1:02	9.999932	3:58	9.998958
8:34	9.995127	8:34	9.995127	8:34	9.995127	8:34	9.995127	8:34	9.995127
80.28	9.993956	81:27	9.995155	83:07	9.996855	84:19	9.997859	86:15	9.999071

That is, take the Complements Arithmetical for the firſt Term in each Canon, and the Operation is performed the eaſier; and now we find when the Sun's Altitude was.

2:15 ——— ——— ——— N. 80:28 E.
3:20 ——— ——— ——— N. 81:27 E.
5:10 the Sun's Azimuth was N. 83:07 E.
6:30 ——— ——— ——— N. 84:19 E.
8:40 ——— ——— ——— N. 86:15 E.

Here we ſhould ſhew you the Figure, and Uſe of the *Azimuth Compaſs*; but as there are very few of them carried to Sea, by any except the *Captains*, and the firſt and ſecond Mates of our *Eaſt India* Ships, I think the Trouble will be needleſs; becauſe there are none admitted to either of thoſe Poſts till they have ſailed ſeveral Voyages, and conſequently by their often ſeeing, muſt have learned the Uſe of them. The Uſe of the *Amplitude Compaſs* is ſo plain and eaſy to be underſtood, it needs no Deſcription nor Uſe here.

PROBLEM X.

The true and magnetical Amplitudes, or Azimuths of the Sun given, to find the Variation of the Compaſs in Quantity and Quality.

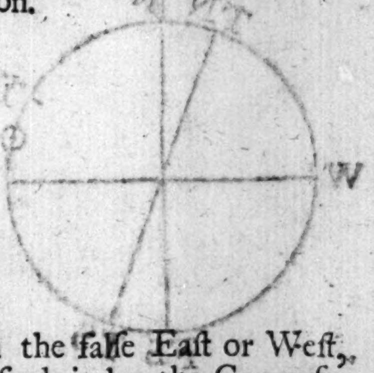
Rule. If both the Amplitudes or Azimuths are in the ſame Quarter of the Compaſs, their Difference is the Quantity of the Variation.

But if one of them is in one Quarter, the other in another Quarter of the Compaſs, their Sum is the Quantity of the Variation.

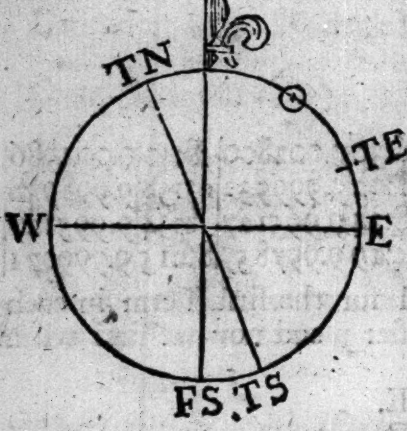
Example I.

Let the magnetical Amplitude be E. 49 : 45 N.
——— The true Amplitude E. 27 : 12 N.

Variation is 22 : 33 E.

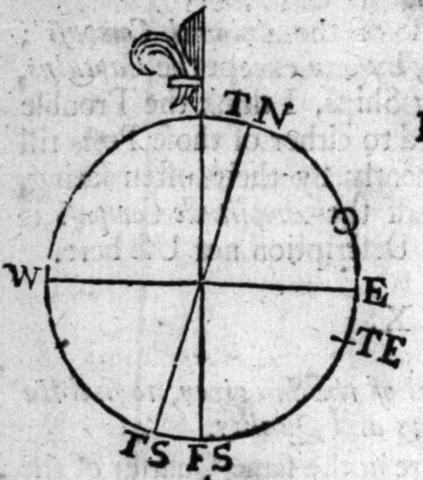


For, always ſet the magnetical Amplitude from the falſe Eaſt or Weſt, towards the falſe North or South, exactly as you find it by the Compaſs, which in this *Example* will be from E to ⊙, which ⊙ is the true Place of the



the Sun at the Time of Setting ; then always from ⊙ ſet the true Amplitude, (which is found by Calculation) the contrary way, *viz.* if it is Northerly, ſet it from the Sun to the Southward ; and when it is Southerly, ſet it from the Sun to the Northward ; ſo will you exactly have TE which is the true Eaſt, or TW the true Weſt, then from TE, or TW, ſet one Quarter of the Compaſs towards the *Flower-de-Luce*, or falſe North, ſo you will have TN, the true North ; and then if the *Flower-de-Luce* is to the Eaſtward of the true North, the Variation is Eaſterly, as in this and the third *Example.*

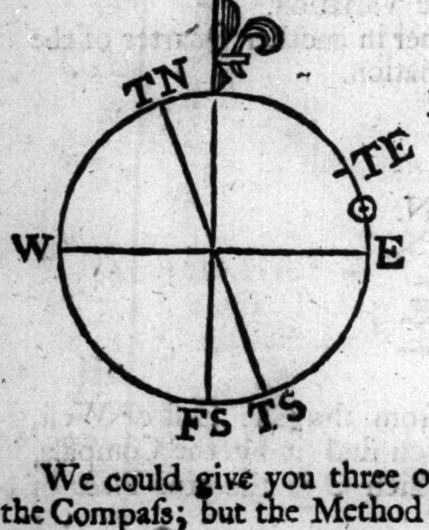
But, If the *Flower-de-Luce* is to the Weſtward of the true North, the Variation is Weſterly, as in



Example 2.

Let the magnetical Amplitude be E. 19:50N.
True Amplitude E. 36:54N.

Variation is 17:04W.



Example 3.

Let the Magnetical Amplitude be E. 11:24N.
True Amplitude E. 12:10S.

Variation is 23:34E.

We could give you three other *Examples* in each of the other Quarters of the Compaſs; but the Method of performing them being the very ſame as in theſe *Examples* in the North Eaſt Quarter, we ſhall not trouble you with them, hoping theſe are ſufficient to make inteligible this *Problem* to the meaneſt Capacity.

Before I treated of finding the Latitude of the Place by Obſervation of the Sun, I thought in two Pages to have Tables for the exact finding the Sun's true Place, Right Aſcenſion and Declination for ever; but being very well acquainted with the Humour of moſt Sailors, who will not trouble themſelves with any more than needs muſt, to carry on the Daily Repetition of their Practice; I choſe rather to let them have a Table only of the Sun's Declination for every Day of the Year, whether it be Leap-year, or the firſt, ſecond, or third Year after it.

And here I thought to let them have a Table of the Right Aſcenſion and Declination of the moſt notable Fixed Stars, with their Uſe in finding the Latitude of the Place by an Obſervation of them, when the Sun is over their Head, and they are running down their Longitude in ſome Parallel of Latitude, between the two Tropicks; and at ſome other Times when the Sun may be clouded for ſeveral Days together at Noon, and they may have clear Star light Nights, and by an Obſervation give a tolerable Account of their Latitude; but as there are few of them that know the Stars, or will take the Trouble of uſing them, when they are ſerviceable to them, I ſhall leave this till the next Impreſſion. As I ſhall alſo a Table of *Artificial Sines* to every Minute of the Quadrant, becauſe it is only uſeful in finding the Sun's Azimuth by the *9th Problem* of *Aſtronomy*, which is uſed [illegible] very few except in *Eaſt India* Ships; and if this Treatiſe ſhould meet with any Encouragement from Gentlemen uſing that Trade, they, with all other Gentlemen uſing the Sea, ſhall be fully ſatisfied in theſe Parts of this Art in the next Impreſſion, (God willing) and I hope, what is at preſent done will ſatisfy the Curious.

FINIS.

ERRATA.

In *Page* 61. *Prob.* 10. the ſecond Clauſe of the *Rule* is omitted, which ſhould be thus,

But, If one Place is in North Latitude, the other in South, the Sum of the Latitudes is the Difference of Latitude between them.

MVSEVM
BRITAN
NICVM

Advertiſement.

Lands exactly Survey'd and Plann'd, with all the Pieces belonging to the ſame Farm, curiouſly ſhaded with the ſame Colour, by which all the Lands of that Farm are at once diſtinguiſhd from the intermix'd Lands, with the true Content of each Piece in Acres, Roods and Perches; the Title, Buttings, and Boundings, with a Tabular Synopſis of the whole Plann done in a curious New-print, with a Scale, Compaſs, and all other uſeful Embelliſhments, by *John Collier*, Surveyor at *Swaffham* in *Norfolk*.